Appendix I

Visual Impact Assessment

Environmental Report

in support of the

Port Ambrose Project Application

September 2012

Topic Report 8 – Coastal Zone Use, Recreation, and Aesthetics

Appendix A

VISUAL IMPACT ASSESSMENT

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SARATOGA ASSOCIATES

PORT AMBROSE PROJECT
VISUAL IMPACT ASSESSMENT

PORTAMBROSE

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Port Ambrose Project – VISUAL IMPACT ASSESSMENT

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Executive Summary

Liberty Natural Gas, LLC ("Liberty") is proposing to construct, own, and operate a deepwater port, known as the Port Ambrose Project ("Port Ambrose" or "Project"), in the New York Bight. The deepwater port proposal is similar in design to two currently operating offshore LNG ports near Boston, Massachusetts and an approved port near Tampa, Florida, and consists of two basic sets of components:

Offloading Buoys: two Submerged Turret Loading™ buoy (STL Buoy) systems (collectively, the Port), which will receive and transfer natural gas from purpose-built LNG regasification vessels (LNGRVs) to the pipeline system; and

Offshore Pipeline Facilities: two offshore subsea lateral pipelines (Laterals) connected to a subsea natural gas mainline (the Mainline).

The STL Buoy systems will be located in water depths of approximately 103 feet (ft) (31m), in federal waters roughly 19 miles (mi) (30 kilometers [km]) off Jones Beach, New York, and approximately 31 mi (50 km) from the entrance to New York Harbor. Natural gas will be delivered through the STL Buoy systems and Laterals into a buried, 21.67 mi (34.87 km) subsea mainline, which will connect offshore with the existing Transco Lower New York Bay lateral for delivery to shore. When not in use, each STL Buoy will be lowered to rest on a landing pad on the ocean floor.

Port Ambrose is designed solely for the delivery of natural gas. Port Ambrose will focus its deliveries during peak winter and summer months to provide additional supplies of natural gas to New York during periods of peak demand.

This Visual Impact Assessment (VIA) objectively evaluates the potential visibility of the Project. It also determines the difference between existing and proposed visual conditions of the ocean and shoreline landscape. This process has been designed to allow decision makers and the public to make an informed judgment of proposed impacts and aesthetic significance.

The study area for this VIA includes beachfront areas up to 25 mi (40 km) from the proposed Port Ambrose location. Beyond this distance, all portions of LNGRVs will fall below the optical horizon when viewed from ground level vantage points. Within the study area, the vast majority of views of the ocean are limited to the immediate shoreline. From most inland locations, water views are quickly screened by dunes, coastal vegetation and/or oceanfront structures. From all vantage points Port Ambrose will be viewed over open water.

The Project study area encompasses shoreline in Nassau and westernmost Suffolk Counties, New York. This region is a highly populated coastal area with numerous public beaches and waterfront recreation areas. During summer weekends, beaches are often at or near capacity. The eastern portion of the study area is comprised of narrow barrier islands which are largely undeveloped park land, including popular Jones Beach and Robert Moses Beach State Parks. The western portion of the study area on Long Beach Island includes substantial oceanfront development. Single- and multi-story residences, public boardwalks and commercial development is of urban density in the City of Long

Beach and the adjacent communities of Point Lookout, Lido Beach and Atlantic Beach where residential streets terminate at the beach and structures are commonly oriented to take advantage of ocean views.

The Project area includes several major shipping lanes that are the principal transit routes for large oceangoing vessels. These vessels are frequently visible from shore as weather conditions permit. The Nantucket to Ambrose traffic lane (westbound) parallels the New York coastline approximately nine (9) miles (mi) (14.4 km) offshore at Jones Beach, NY. The Ambrose to Nantucket traffic lane (eastbound) parallels the coastline approximately 14 mi (22 km) offshore (at Jones Beach).

Viewers affected by the Project are likely to be local residents, vacationers and day-use recreational users who visit the Nassau and western Suffolk County beaches to enjoy the scenic, recreational, social, and cultural ambiance of the coastal landscape. Viewers currently experience a nearly unbroken stretch of waterfront development throughout the western portion of the study area including dense high- and low-rise residential housing, vacation accommodations, commercial establishments and recreational and entertainment facilities on Long Beach Island. In contrast, Jones Beach Island and Fire Island to the east are largely undeveloped public parkland. Jones Beach State Park, Robert Moses State Park and several other state and municipal beaches are visited by hundreds of thousands day-use beach goers each summer season.

Impact Assessment – The Project will have no land based port structures or storage facilities since the gas is converted onboard the transient LNGRV in a closed-loop system and delivered onshore to existing storage and energy production facilities. No visual impacts will be associated with the STL Buoy mooring system or sub-sea pipeline. The only visible Project component will be up to two transient LNGRV’s moored a minimum of approximately 19 mi (30 km) offshore.

From ground level vantage points along the Long Island beaches, moored LNGRVs will appear to be quite low on the horizon and as distance increases, increasingly difficult to distinguish; if visible at all. When visible, LNGRVs will generally appear as small two-dimensional rectilinear form on the distant horizon.

From beach, boardwalk and dune elevations, the hull of the LNGRV (trunk deck and below [78 ft or 23.7 meters above water line]) will fall below the visible horizon as viewed from all costal vantage points. Only relatively minor structures, such as masts, cranes, navigation bridge, crew quarters and stack, could potentially be visible above the horizon. Combined with atmospheric haze, even on a relatively clear day, these taller vessel structures would be difficult to discern with the naked eye. Due to the project's extended off-shore distance, visibility of the LNGRV hull is possible only from the upper floors of oceanfront high-rise buildings in the City of Long Beach.

Meteorological conditions (e.g., haze, fog, precipitation, etc.) limit visibility to less than 10 nautical miles (nm) (11.5 miles [18.5 km]) approximately 48 percent of the time on an annual basis. In general, views greater than 10 nm are obscured more frequently during the summer months (approximately 60 percent of the time), when oceanfront destinations are more frequently visited. Since meteorological visibility is recorded in increments only up to 10 nm, coastal vantage points 16.5 nm (19 mi [24.1 km]) and beyond would be obscured more frequently.

The Project area includes several major shipping lanes that are the principal transit routes for large oceangoing vessels. Ocean-going vessels similar in size and appearance to LNGRVs are commonly, and often clearly, visible within these heavily used shipping lanes at distances substantially closer to shore than the proposed Project.

Based on these findings, it is clear that the proposed Project will be minimally visible from the Long Island shore. The Project will not diminish public enjoyment or appreciation of the beaches or result in a detrimental effect on aesthetic resources of the region.

1.0 INTRODUCTION

Liberty Natural Gas, LLC (Liberty) is proposing to construct, own, and operate a deepwater port, known as the Port Ambrose Project, in the New York Bight. To address issues of potential visual impact, AECOM (under contract to Liberty) has retained Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga) to conduct a thorough and detailed Visual Impact Assessment (VIA) of the Project. The purpose of this VIA is to identify potential visual and aesthetic impacts and to provide an objective assessment of the visual character of the Project, using standard accepted methodologies of visual assessment, from which agency decision-makers can render a supportable determination of visual significance.

1.1 PROJECT LOCATION

Port Ambrose will be located 19 mi (30 km) off Jones Beach, New York, and approximately 31 mi (50 km) from the entrance to New York Harbor. The average water depth in the buoy areas is approximately 103 ft.

The Project area in the New York Bight includes several major shipping lanes that are the principal transit routes for large oceangoing vessels. The Nantucket to Ambrose traffic lane (westbound) parallels the New York coastline approximately nine (9) mi (14.4 km) at Jones Beach. The Ambrose to Nantucket traffic lane (eastbound) parallels the coastline approximately 14 mi (22.3 km) offshore (at Jones Beach). The Hudson Canyon to Ambrose traffic lane (northbound) is approximately 23 mi (37 km) offshore (at Jones Beach). The proposed Project will be located between the Ambrose to Nantucket traffic lane and the Hudson Canyon to Ambrose traffic lane. Ocean-going vessels similar in size and appearance to LNGRVs are commonly, and often clearly visible within these heavily used shipping lanes at distances substantially closer to shore than the proposed Project. Figure 1 on page 11 illustrates the Project location.

1.2 PROJECT DESCRIPTION

The Port Ambrose Project is designed to be exclusively offshore and to interconnect with the existing Transco Lower New York Bay Lateral pipeline. The Project includes two STL Buoys permanently moored to the seabed. The STL Buoys will be connected to a high-pressure subsea pipeline directly into the consumer grid system.

LNG will be transported to the proposed port in double-hulled ocean-going LNGRVs. At the proposed port, LNGRVs will temporarily connect to the STL buoys below waterline. LNG will be converted to natural gas (regasified) onboard each LNGRV and pumped through two offshore subsea lateral pipelines (Laterals) to a subsea mainline, which will connect to the existing Transco Lower New York Bay Lateral pipeline (a subsea natural gas mainline), and from there into existing transmission pipelines.

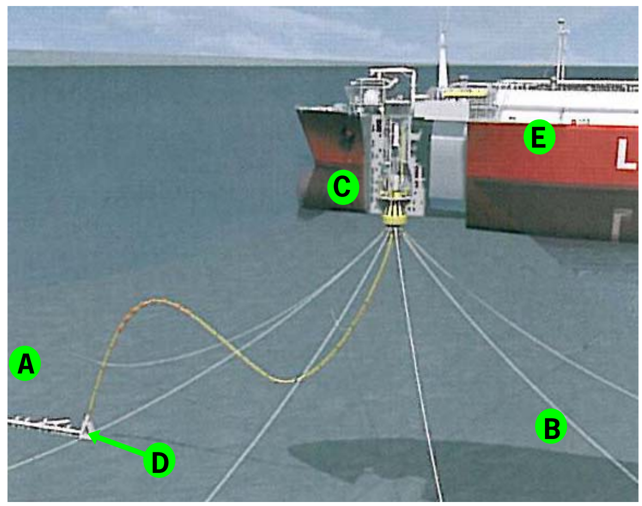
The Project will have no on-shore port facility or land based structures since the gas is converted onboard the transient LNGRV in a closed-loop system and delivered through the STL Buoy systems, laterals and buried subsea pipeline to an existing subsea natural gas pipeline system for delivery to shore.

The only visible Project component will be up to two transient LNGRVs moored approximately 19 (30 km) offshore. No permanent visual impacts will be associated with the submerged turret buoy system or sub-sea pipeline.

1.2.1 Offloading Facility

The proposed port consists of two dedicated STL Buoys moored to the seabed with anchor chains that will in turn be connected and secured to an engineered anchoring system.

When the LNGRV arrives at the offshore terminal, the vessel converts its LNG cargo to natural gas. The converted gas is then offloaded using the STL Buoys, which connects with the vessel's hull below the water line. In its idle state, the STL Buoy is set in a submerged resting position. During operation, the STL Buoy 'rises' to connect with the arriving LNGRV. The STL Buoy's anchoring system is used to secure the LNGRV. The port's pipeline end manifold connects the STL Buoy to the sea-floor pipeline, and is designed to regulate the transmission of gas through the port.



Primary Components of Proposed Offloading Facility
A-Seafloor Pipeline, B-Mooring System, C-Submerged Turret Buoy
D-Pipeline End Manifold, E-Attendant LNGRV

All Project components, from the transient LNGRVs, remain underwater. Likewise, offloading and transmission of natural gas is performed underwater. To an observer on the surface, visual evidence of the port will be limited to the presence of temporarily moored LNGRVs. While moored, the LNGRVs will be allowed to pivot or 'weathervane' in order to accommodate the forces of tides, currents, and wind conditions. Absent the presence of the LNGRV, the Project is entirely sub surface with no visibility from on-water or land based vantage points.

1.2.2 LNG Regasification Vessels

The port is designed to service a particular class of shipping vessel, the LNGRV. These are doubled-hulled tankers with a cargo capacity of up to 145,000 cubic meters. LNGRVs will vary in size depending on capacity and tank containment design. In general, the largest of these tankers will be roughly 928 ft (283 m) long, 140 ft (43 m) wide and rise about 120 ft (36.5 m) above water line. These vessels will be similar in size and visual character to other large ocean-going

Table 1 – Height of Major Structures

Structure	Height above Waterline[1]	
Main Deck	72 feet	(22.1 m)
Trunk Deck	78 feet	(23.7 m)
Compass Deck	120 feet	(36.5 m)

[1] The variation in draft (maximum anticipated differential waterline elevation between design [loaded] draft and ballast [unloaded] draft) is approximately 2m±. The above dimensions are based on ballast draft elevation.

freighters that commonly transit the ocean in this area. Table 1 identifies the approximate height of LNGRV components.

Up to two LNGRVs may be moored at the port at any one time. Each LNGRV may be moored at the port for days regasifying and off-loading. Figure 2 identifies the primary components of the LNGRV.

The color scheme of the LNGRVs will be specific to the individual vessel. This evaluation assumes the all LNGRVs will be painted with a bright orange hull and white deck as illustrated in the figure to the right.

The LNGRV will be well-illuminated for operational and safety purposes. Lighting systems will be specific to the individual vessel, but will likely include high intensity floodlighting of deck and equipment handling areas during off-loading operations.

Sample LNGRV Color Scheme

1.2.3 Interconnect

The Project will deliver natural gas to the existing sub-sea Transco Lower New York Bay Lateral natural gas pipeline system via a subsea mainline. No permanent visual impacts will be associated with the subsea pipeline, and this VIA does not address the interconnect.

1.3 Visual Impact Regulatory Requirements

There are no specific Federal rules, regulations, or policies governing the evaluation or mitigation of visual resources. The process used to evaluate potential impact on scenic resources follows the basic New York State Department of Environmental Conservation Program Policy "Assessing and Mitigating Visual Impacts" (NYSDEC 2000) (DEC Visual Policy) and State Environmental Quality Review (SEQRA) criteria to minimize impacts on visual resources. This process provides a practical guide so decision makers and the public can understand the potential visual impacts and make an informed judgment about their significance (aesthetic impact).

1.4 Determination of Study Area

The study area for this visual resource assessment includes beachfront areas up to 25 mi (40 km) from the proposed Port. Twenty-five miles is a highly conservative study range considering the effect of earth curvature on line-of-sight. At this distance all portions of the LNGRV will fall below the optical horizon when viewed from a boardwalk level vantage point along the oceanfront (assume 20 ft [6.1 m] above sea level). A more detailed discussion of the effect of meteorological conditions on view distance is found in Section 3.1.3, on page 21.

The vast majority of views of the Port are limited to immediate waterfront locations. Ocean front structures, sea walls, and dunes typically block ground level views of the water from inland areas. Few ground level vantage points with views of the ocean exist inland of the dune line. Views from high-rise structures afford views from further inland; however, most high-rise structures are located along the oceanfront. For this reason, the focus of this VIA is on beachfront views.

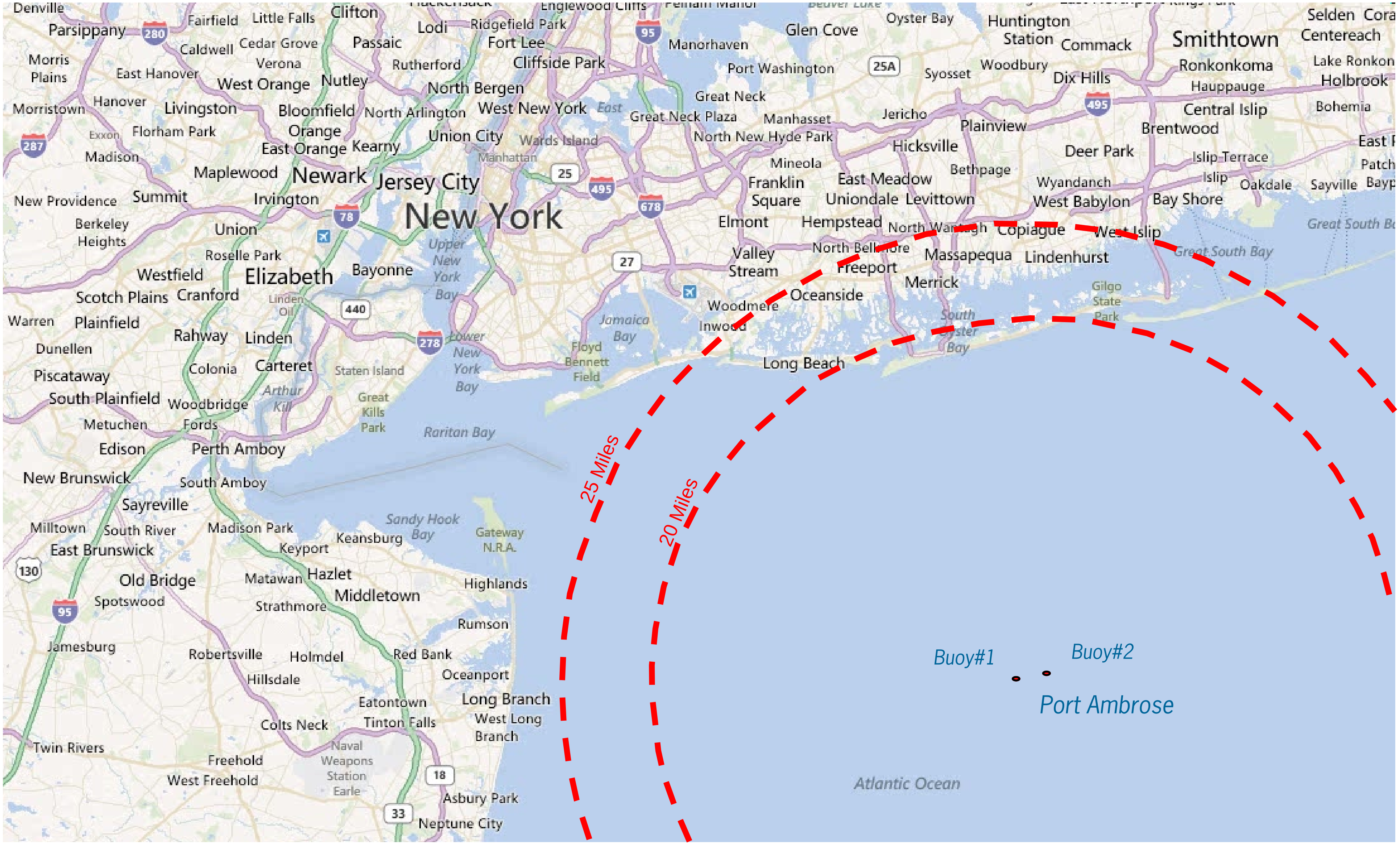


FIGURE 1

Location Map

Proposed LNGRV

FIGURE 2

General LNGRV Dimensions

2.0 LANDSCAPE CHARACTER/VISUAL SETTING

The visual setting is defined by the basic pattern of landform, land use, vegetation, and in this application especially, water features that make up a view. This visual setting, or existing landscape character is the baseline condition from which visual change can be evaluated.

The study area encompasses approximately 30 mi (48 km) of shoreline along New York's Long Island coast in Nassau and western Suffolk Counties. In order to assess the landscape of this setting, the shoreline area is divided into three categories; 1) open water, 2) beach, and 3) landward areas. Each distinct category is a linear environment parallel to the shore containing definitive variations in the landscape.

2.1 OPEN WATER

The waters of the near shore Atlantic Ocean contain a variety of boats and ships including freighters, ferries, and pleasure craft. Smaller vessels and recreational boats are a common sight from the beach. Recreational and charter fishing vessels are more common during warm weather months. Commercial fishing vessels operate year round.

The Project area in the New York Bight includes several major shipping lanes that are the principal transit routes for large oceangoing vessels that are frequently visible from shore. The Nantucket to Ambrose traffic lane (westbound) parallels the New York coastline approximately 9 mi (14.4 km) offshore at Jones Beach. The Ambrose Nantucket traffic lane (eastbound) parallels the coastline approximately 14 mi (22.3 km) offshore (at Jones Beach). The Hudson Canyon to Ambrose traffic lane (northbound) is approximately 25.2 mi (40.41 km) offshore (at Jones Beach). The proposed Port is located between the Ambrose to Nantucket traffic lane and the Hudson Canyon to Ambrose traffic lane.

Numerous rock jetties extend from the beach into the open water zone. The jetties range in width of 15 to 50 ft (4.6 m to 15.2 m) wide and project approximately 100 ft (30.5 m) into open water.

Atmospheric conditions are more noticeable over the open water than over land, due to long visual distances and humid conditions near the water surface. Haze and smog, which can be particularly severe in the summer, can diminish or obscure the visibility of features on the water and make the visible horizon more difficult to discern.

The color of the seawater along this shore is varied and seasonal, ranging from muted and brackish shades of blue-green and gray. At distances near the horizon, water colors take on uniform gray tones. Cloud cover, wind, sun reflectance, and surface glare also affect the color of the water. The visible texture of the water surface is affected by the action of waves. These factors contribute to an amalgam of shimmering colors and patterns of light that are of aesthetic interest and may command the attention of observers. They also have the effect of obscuring discernible objects in or over the water. Sun glasses; particularly polarized lenses commonly worn by beach goers, noticeably reduce glare on the water surface making distant offshore objects more visually apparent.

2.2 Beach Zone

Miles of wide sand beaches are a defining aesthetic feature of the Long Island shore and are a significant regional attraction for sunbathers, fishermen, and beachcombers. During summer weekends, certain stretches of beach are at capacity. As a daytime destination, visitors bring brightly colored umbrellas, coolers, folding chairs, towels and recreational watercraft. Southerly views from the beach would encompass views of the open water environment. Northerly views commonly include sand dunes and oceanfront environmental areas, boardwalks, buildings, roadways and parking lots.

The beach zone is almost exclusively comprised of tan colored beach sand, however there are rock groins and breakwaters. The beach environment generally ranges in width from 100 to 500 ft (30 m to 150 m). In many areas, rock groins are located at regular distances for erosion control purposes. Only infrequently are building structures located directly in the beach zone.

2.3 Landward Areas

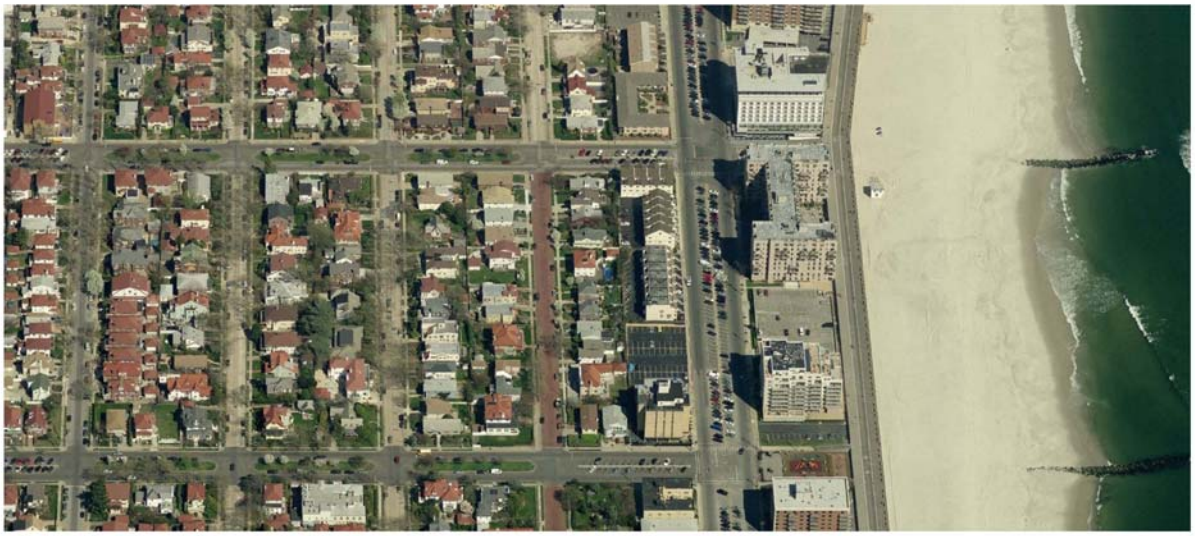
2.3.1 Long Beach Island

Long Beach Island, at the western end of the study area, is a barrier island off of the southern coast of Long Island. Comprised of the oceanfront communities of Atlantic Beach, Long Beach, Lido Beach and Point Lookout, this narrow island includes densely populated residential and commercial districts as well as a number of municipal parks and beaches. Streets are generally aligned in the traditional urban grid. Residential lots for single-family homes are urban in scale, with some having street frontages of less than 50 ft (15.2 m). Multi-family complexes and apartments rise several stories and are accompanied by hardscape elements such as pools, decks, fencing, and parking lots. High-rise development along the oceanfront is marked by short setbacks from streets.

Landward development is a collection of development styles and patterns reflecting the prevailing design practices at the time of construction, from pre-World War II through to the present day. Oceanfront buildings are typically one to two stories in height, however, three to four story tall condominium type structures and are also found. Four to seven story high-rise buildings line the oceanfront for approximately 18 blocks. The tallest oceanfront structure within the area of study is approximately 10 stories. Prevailing architecture is modern and sometimes austere, and contributes to the definition of this area as an urbanized environment.

Defining features of this urban setting are streets, sidewalks, on- and off-street parking, commercial and public signage, lighting, and utility structures such as traffic signals and signs, poles, wires, and other urban infrastructure. In addition to these features are the activities associated with them—vehicle traffic, retailing, parking, walking, recreation, etc. Taken together, their presence often visually extends into the beach zone. The overall visual impact is that of an urbanized beachfront setting.

The City of Long Beach has a two (2) mi stretch of boardwalk separating the public beach from private beachfront properties and oceanfront boulevards. This 50 foot-wide boardwalk is highly popular for walking, bicycling and rollerblading activities and often provides direct access to popular beach related businesses such as concessions, restaurants, shops and entertainment establishments.



High-rise Inland Zone at Long Beach

Low-rise Inland Zone at Long Beach

2.3.2 Jones Beach Island Fire Island

Seventeen (17) mile long Jones Beach Inland is separated from Long Beach Island by the Jones Inlet. The island straddles the county line between Nassau and Suffolk counties and includes the small beachfront communities of Gilgo Beach and Oak Beach. The southern side of this narrow barrier island is known for its scenic beaches that face the open Atlantic Ocean. Jones Beach State Park, on the western tip of the island is the most popular and heavily visited beach on the east coast, with an estimated six million visitors per year.[1]

[1] http://en.wikipedia.org/wiki/Jones_Beach_State_Park

Fire Island, across the Fire Island Inlet from Jones Beach Island is the third in the string of barrier islands within the study area. Robert Moses State Park, at the west end of Fire Island, is also a popular oceanfront summer recreation destination for the New York City and inland Long Island areas. To the east of Robert Moses State Park is the private oceanfront seasonal residential community of Saltaire, at the eastern limit of the 25-mile project study area.

Jones Beach Island and Fire Island are largely undeveloped beach, dune and nature preserve areas. The character of Jones Beach Island and western Fire Island is typical of Atlantic barrier islands that grade from a primary dune along the ocean to salt marsh along the bay. The dominant vegetation includes pitch pine, beach grass, wax myrtle, bayberry, shadbush and common greenbrier. Coastal dunes are found adjacent to beach areas. Dunes are commonly continuous linear features, but are also formed as isolated hummocks. The elevation of the barrier islands within the study area rarely exceeds 20 ft above sea level.

Although the undeveloped and natural oceanfront and dune landscape of Jones Beach and Fire Islands is highly scenic, the high summer visitation rates at Jones Beach and Robert Moses State Parks significantly alters the visual character of the beach area. Thousands of beach goers with brightly colored umbrellas, coolers, folding chairs, towels and recreational amenities are a significant component of the visible landscape during the summer months. Large parking fields accommodate thousands of vehicles immediately adjacent to designated swimming beaches.

Recreational Development in the Inland Zone at Jones Beach State Park


Undeveloped Inland Zone at Jones Beach State Park

3.0 FACTORS AFFECTING VISUAL IMPACT

3.1 VISUAL CHARACTERISTICS

3.1.1 Curvature of the Earth

From all vantage points the proposed project will be viewed over open water at great distance (greater than 19 mi (30 km) from any coastal vantage point). At such extended distance the curvature of the earth will affect the visibility of the proposed Port. The degree of screening caused by earth curvature depends on the elevation of the viewer above sea level (asl) and the distance of the viewer from the proposed project.

The degree of visibility above the visible horizon for any object can be geometrically calculated using the Pythagorean Theorem (a2+b2=c2). The distance that the target object will become visible above the horizon from a known vantage point is the sum of the distance between from the viewer location to the visible horizon and the distance from the target object to the visible horizon.

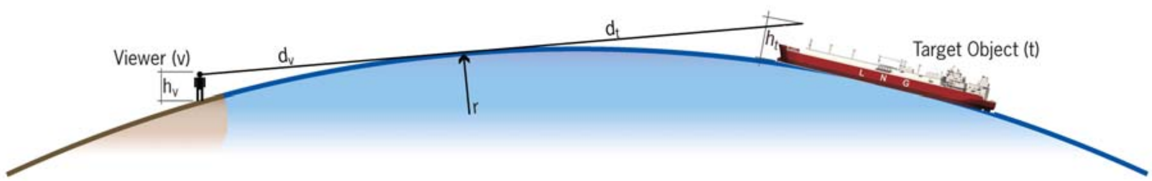


Figure 3 – Geometric Horizon Diagram

The distance to the geometric horizon from any point is calculated as follows:

From the Pythagorean theorem:	Where;
$r^2+d^2=(r+h)^2$,	d=distance to horizon;
Simplifying;	h=elevation (asl) of viewer (eye level) or target object; and
d = square root of (h^2+2hr)	r=radius of the earth (3,963 miles = 20,924,640 feet)

The sightline distance between viewer (v) and target object (t) = d_v+d_t

The distance to the optical horizon is slightly greater than the simple geometric calculation, because the atmosphere bends light around the earth (atmospheric refraction) allowing a viewer to see farther. The exact amount of bending depends on several variables including elevation and the composition of the atmosphere (which varies with location, weather, etc.). A commonly accepted rule of thumb is that the optical horizon is calculated by multiplying the radius of the earth by a factor of 1.2 in the above formula to adjust for this optical effect.[2]

Table 2 summarizes the degree of visibility of the Project given varying viewer elevations and distances from the Project. For example, using Table 2, at a distance of approximately 19 mi (30 km), the lower 95 ft (29 meters) of an LNGRV will fall behind the optical horizon as observed by a viewer standing at boardwalk level (approx. 20 ft [6 m] above sea level).

[2] A simple on-line calculator to determine the distance to the horizon can be found at http://www.boatsafe.com

Table 2 – Portion of LNGRV Falling Below Optical Horizon

	Viewer Eye Elevation in Feet (meters)	18.5 (29.8)	19.0 (30.6)	19.5 (31.4)	20.0 (32.2)	20.5 (33.0)	21.0 (33.8)	21.5 (34.6)	22.0 (35.4)	22.5 (36.2)	23.0 (37.0)	23.5 (37.8)	24.0 (38.6)	24.5 (39.4)	25.0 (40.2)
		Distance in Miles (kilometers)													
Beach Elev.	6.6 (2)	38	41	44	46	49	52	55	58	62	65	68	72	75	79
	9.8 (3)	35	37	40	42	45	48	51	54	57	60	63	66	70	73
	13.1 (4)	32	34	36	39	41	44	47	50	53	56	59	62	65	69
	16.4 (5)	29	31	34	36	38	41	44	46	49	52	55	58	62	65
Boardwalk Elev.	19.7 (6)	27	29	31	33	36	38	41	44	46	49	52	55	58	61
	23.0 (7)	25	27	29	31	34	36	38	41	44	47	49	52	55	58
	26.2 (8)	23	25	27	29	31	34	36	39	41	44	47	50	53	56
	29.5 (9)	21	23	25	27	30	32	34	37	39	42	45	47	50	53
	32.8 (10)	20	22	24	26	28	30	32	35	37	40	42	45	48	51
	36.1 (11)	18	20	22	24	26	28	31	33	35	38	40	43	46	49
	39.4 (12)	17	19	21	23	25	27	29	31	34	36	39	41	44	47
	42.7 (13)	16	18	20	21	23	25	27	30	32	34	37	39	42	45
	45.9 (14)	15	17	18	20	22	24	26	28	30	33	35	38	40	43
3rd Story Elev.	49.2 (15)	14	16	17	19	21	23	25	27	29	31	34	36	39	41
	52.5 (16)	13	15	16	18	20	22	24	26	28	30	32	35	37	40
	55.8 (17)	12	14	15	17	19	20	22	24	26	29	31	33	36	38
	59.1 (18)	11	13	14	16	18	19	21	23	25	27	29	32	34	37
	62.3 (19)	11	12	13	15	17	18	20	22	24	26	28	30	33	35
	65.6 (20)	10	11	13	14	16	17	19	21	23	25	27	29	31	34
	68.9 (21)	9	10	12	13	15	16	18	20	22	24	26	28	30	33
	72.2 (22)	9	10	11	13	14	16	17	19	21	23	25	27	29	31
	75.5 (23)	8	9	10	12	13	15	16	18	20	22	24	26	28	30
	78.7 (24)	7	9	10	11	13	14	16	17	19	21	23	25	27	29
	82.0 (25)	7	8	9	10	12	13	15	16	18	20	22	24	26	28
	85.3 (26)	6	7	9	10	11	13	14	16	17	19	21	23	25	27
	88.6 (27)	6	7	8	9	11	12	13	15	17	18	20	22	24	26
	91.9 (28)	5	6	7	9	10	11	13	14	16	17	19	21	23	25
	95.1 (29)	5	6	7	8	9	11	12	13	15	17	18	20	22	24
	98.4 (30)	5	5	6	8	9	10	11	13	14	16	18	19	21	23
8th Story Elev.	101.7 (31)	4	5	6	7	8	9	11	12	14	15	17	19	20	22

Note: Gray shaded cells indicate viewer elevation (in feet) and distance at which all portions of the LNGRV compass deck (120 feet [36.5 m]) will fall below the optical horizon.

Based on Table 2, a 120 foot (36.5 m) tall LNGRV will fall completely below the optical horizon at a distance of approximately:

- 18.5 mi (29.9 km) for an observer at beach elevation (6.6 ft [2 m] above sea level);
- 20.5 mi (33 km) for an observer at boardwalk elevation (19.7 ft [6 m] above sea level);
- 24 mi (38.6 km) for an observer on the third floor of a waterfront building (49.2 ft [15 m] above sea level); and

Because the closest point of land to the LNGRV is nearly 19 mi away, the LNGRV will fall completely below the horizon for an observer standing at beach elevation for all locations within the study area. More simply stated, the LNGRV will not be visible from the beach anywhere within the study area.

Similarly, The LNGRV will not be visible from boardwalk level at distances greater than 20.5 mi. For vantage points closer that 20.5 mi, only the upper portion of the LNGRV would be visible above the horizon.

Beyond approximately 20.5 mi visibility of the LNGRV is only possible from the upper floors of oceanfront structures on Long Beach Island.

3.1.2 Mirage Effects

When visible the Port will be viewed most often over open water and at great distances, the effect of mirage will occasionally alter the appearance of the proposed Port. A mirage is a naturally occurring optical phenomenon where distant objects appear displaced from their true position. The bending of light rays by thermal gradients in the atmosphere causes this optical displacement.

An "inferior mirage", the most common mirage type, forms when light rays passing through a relatively warm layer of air are bent upward from their path. The resulting image of distant objects may appear to be inverted and displaced downward. The farther away the object, the more of the lower portion of its image will vanish. For example, the upper decks of a distant ship might appear erect and inverted and apparently floating above and disconnected from the optical horizon while the lower decks will not be seen at all.[3]

"Superior mirages" are much less common. Superior mirages are characterized by an image that is displaced upward from the position of the object. These occur mainly over the horizon of the sea when distant objects appear upside down in the sky. Sometimes there is an erect image of the same object that will be above the upside-down image. This is more common in cold areas and conditions with a strong change of temperature where warmer layers of air rise above the cooler layers.[4]

Some mirages have specific names:[5]

> <u>Looming</u> – Appearance of objects usually hidden below the horizon. Normally occur over water surfaces when normal rate of air thickness decreases and altitude is heightened.

> <u>Sinking</u> – Reverse effect of the above phenomenon. Occurs when the opposite conditions at sea take place. In sinking, the vessels, boats and shorelines that are seen on the horizon, seem to sink below and become invisible.

> <u>Towering</u> – Occurs due to irregular refraction. Light rays curve downward, with the top of the object curving more than the lower ones. The observer will see objects which seem to be lifted up more then they need to be and will be enlarged in the vertical direction.

> <u>Stooping</u> – When the light rays of the distant object curve downward less than the rays at the bottom. This vertical contraction gives it this name. It results in objects on the horizon being observed with the rising or setting of the sun and the moon. One may often see a distortion caused by irregular layer effects of the lower atmosphere strata.

[3] http://amsglossary.allenpress.com
[4] http://www.light-science.com
[5] http://amsglossary.allenpress.com

3.1.3 Meteorological Visibility

Visibility can be reduced by fog, snow, particulate matter, smog or any combination of them, and is a part of normal atmospheric phenomena.

Table 3 summarizes the results of a surface meteorological visibility analysis conducted by the Naval Oceanography Command Detachment for this portion of the Atlantic seaboard.[6] The data was collected in grid areas one degree in longitude by one degree in latitude (an area encompassing approximately 60 nautical miles [nm] by 46nm). The area of study falls within the grid area bounded by 40º to 41ºnorth latitude and 73º to 74º west longitude.

Table 3 – Maximum Visible Distance as Percent of Time

	Distance in Nautical Miles					
	<0.5 (0.6 km)	**.05 to 1 (0.6 km to 1.1 km)**	**1 to 2 (1.1 km to 2.3 km)**	**2 to 5 (2.3 km to 5.8 km)**	**5 to 10 (5.8 km to 11.5 km)**	**Total < 10 (11.5 km)**
January	3.5	2.2	2.7	6.4	26.1	40.9
February	3.5	2.1	3.7	6.7	25.8	41.8
March	5.8	2.9	2.1	7.1	25.8	43.7
April	5.1	2.2	1.9	7.5	28.2	44.9
May	8.7	3.8	3.1	7.2	34.4	57.2
June	7.3	3.0	3.2	12.3	35.8	61.6
July	3.9	2.2	2.9	10	40.5	59.5
August	1.6	1.5	2.9	11.1	39.4	56.5
September	1.6	2.4	1.4	8.7	36.9	51
October	3.5	2.7	1.7	4.9	28.8	41.6
November	1.6	0.9	2.6	4.3	31.6	41
December	2.2	1.8	1.2	4.7	33.0	42.9
Year Average	4.0	2.3	2.4	7.6	32.0	48.2

The results of this analysis indicate that haze, fog and other atmospheric conditions limit visibility to less than 10 nm (11.5 mi [18.5 km]) approximately 48 percent of the time on an annual basis. In general, views greater than 10 nm are obscured more frequently during the summer months (approximately 60 percent of the time), when oceanfront vacation areas are more heavily used.

It is important to note that visibilities greater than 10 nm are still reported as 10 nm. Therefore, given the nearest shoreline vantage point is 16.5nm (19 mi [30 km]) it is reasonable to conclude that the project will be obscured from coastal vantage points more frequently than identified in Table 3.

Even on the clearest of days, the sky is not entirely transparent because of the presence of atmospheric particulate matter. The light scattering effect of these particles causes a reduction in the intensity of colors and the contrast between light and dark as the distance of objects from the observer increases. Contrast depends upon the position of the sun and the reflectance of the object, among other items. The net effect of this phenomenon, known as atmospheric perspective, is that objects appear "washed out" over great distances.[7] Thus, even with meteorological visibility exceeding the offshore distance of the Port, the Project may still appear indistinct to the human eye.

3.1.4 Linear Perspective

Linear perspective is the reduction in the apparent size of objects as its distance from the observer increases. Linear perspective is sometimes referred to as scientific or size perspective. As an observer

[6] U.S.Navy Regional Climatic Study of the United States Atlantic Coast and Associated Waters, January 1989
[7] NYSDEC Visual Policy, p.10

moves further and further from an object, the smaller the object appears. Beyond a certain distance, depending upon the size and degree of contrast between the object and its surroundings, the object may not be a point of interest for most people. At this hypothetical distance it can be argued that the object has little impact on the composition of the landscape of which it is a tiny part. Eventually, at even greater distances, the naked eye is incapable of seeing the object at all.[8]

Exclusive of the effect of earth curvature and meteorological visibility, a broadside view of the LNGRV at a distance of 19 mi (30km) would measure only 0.51 degrees horizontally on the horizon and 0.07 degrees vertically. While this very small degree of visibility might be perceptible to a distant observer, it is unlikely to be considered significant at such extended distance.

3.1.5 Distance Zones

Distance can be discussed in terms of pre-defined distance zones: foreground, middleground and background. Each zone represents a set of visual conditions that are predictive of how an object will appear to change from zone to zone.

<u>Foreground (0 to 1/2 mile [0 km to 0.8 km])</u> – At a foreground distance, viewers typically recognize a very high level of detail. Contrast and color intensity are at their greatest. In the foreground zone, human scale is an important cognitive factor in judging spatial relationships and the relative size of objects. From this distance, the sense of form, line, color and textural contrast with the surrounding landscape is highest. The visual impact is likely to be considered the greatest at a foreground distance.

With the nearest coastal vantage point approximately 19 mi (30 km) from the Project, only far offshore vessels passing within very close proximity may view the facility from the foreground distance zone. With the outer margin of the foreground distance zone at least 18.5 mi (29.2 km) off-shore, the number of vessels passing within ½ mile of the proposed LNG terminal is expected to be very limited considering smaller watercraft typically navigate much closer to shore. Moreover, for security reasons, 1,640 foot safety zones (500 m) will be established surrounding each STL Buoy and LNGRV, limiting the distance at which vessels can pass.

With the largest LNGRV vessels approximately 928 ft (283 m) long and 120 ft (36.5 m) above waterline, at such close range LNGRV's will dominate the scene and be the overwhelming visual point of interest to boaters passing in close proximity. Figure A-1A illustrates a typical LNGRV from the foreground distance zone.

<u>Middleground (1/2 mile to 3 miles [0.8 km to 4.8 km]</u>) – This is the distance where elements begin to visually merge or join. Colors, intensity, and textures become muted by distance, but are still identifiable. Visual detail is reduced, although distinct patterns may still be evident. Viewers at middleground distances typically recognize surface features such as tree stands, building clusters and small landforms. Scale is perceived in terms of identifiable features of development patterns. From this distance, the contrast of color and texture are identified in terms of their regional context rather than of the immediate surroundings.

[8] NYSDEC Visual Policy, p.10

Boaters passing within three miles will view the Project from the middleground distance zone. With the outer margin of the middleground distance zone at least 16 mi (25 km) off-shore, the number of vessels passing within three miles of an LNGRV is expected to be limited considering smaller watercraft typically navigate much closer to shore.

Due to the scale of the LNGRV within the context of an open water setting, the Port will remain easily distinguishable and a visually dominant element from middleground vantage points. Figure A-1B illustrates what a typical LNGRV will look like from the middleground distances.

Background (3 – 5 miles [4.8 km – 8.0 km] to Horizon) – At this distance, landscape-scaled elements lose detail and become less distinct. Contrast and color intensity become significantly less. Meteorological conditions and atmospheric perspective change colors to blue-grays, while surface characteristics are lost. Visual emphasis is on landmass outlines and skylines.

With the nearest coastal vantage point approximately 15 miles (24.1 km) away, only boaters will view the Project from near-background distances. While noticeably less dominant and visually less distinctive, the LNGRV's will remain a point of interest over open water under clear weather conditions. The visual complexity of deck infrastructure will blend as a monochromatic two-dimensional profile of the overall structure. Within the context of open water the LNG terminal will remain a point of visual interest for an extended distance, although decreasing in visibility, clarity and perceived importance with increasing distance.

All shoreline receptors will view the Project within the far background distance zone with minimal visibility and perceived importance. Figure A-1C, Figure A-1D and Figure A-1E illustrate typical LNGRV's as viewed from the background distance zone.

3.1.6 Study Area Example of Offshore Visual Conditions

Figure 4 illustrates the actual visibility large ocean going cargo vessels observed within the Project study area on April 13, 2012. On this day a freighter was observed approaching New York Harbor in the Nantucket to Ambrose shipping lane approximately 8 mi off-shore. A second vessel was observed departing New York harbor in the Ambrose to Nantucket shipping land approximately 11 mi off-shore. Four large vessels were observed at anchor approximately 6-7 mi off Long Beach Island.

In these photographs, the effect of earth curvature on the visibility of these vessels is clearly evident. Weather conditions on this day were clear with metrological visibility well in excess of 10 nautical miles. Even under these ideal conditions the phenomenon of atmospheric perspective reduces the intensity of color and contrast of the vessels making the vessels appear somewhat washed out. While these vessels were clearly visible to the naked eye from boardwalk elevation, these factors combine to render the view visually subordinate to foreground elements and the expanse of ocean that comprise the setting.

The Port is approximately 19 mi (30 km) from the nearest coastal vantage point, more than twice the distance of the vessel observed within Nantucket to Ambrose shipping lane and nearly three times the distance of the vessels observed at anchor.

FIGURE 4A

Example of Distant Offshore Visual Conditions
Atlantic Beach Town Park
City of Atlantic Beach, NY

FIGURE 4B

Example of Distant Offshore Visual Conditions
Long Beach Boardwalk
City of Long Beach, NY

FIGURE 4C

Example of Distant Offshore Visual Conditions
Jones Beach State Park—East Bathouse
Town of Hempstead, NY

FIGURE 4D

Example of Distant Offshore Visual Conditions

Robert Moses State Park—East Beach

Town of Babylon, NY

3.2 Viewer/User Groups

Viewers engaged in different activities while in the same setting are likely to perceive their surroundings differently. The description of viewer groups is provided to assist in understanding the sensitivity and probable reaction of potential observers to visual changes resulting from the proposed project.

3.2.1 Tourists, Vacationers and Recreational Users

One of the coastal area's greatest assets is the view of the Atlantic Ocean and its shoreline landscape. The New York coast has long been a popular destination offering a variety of recreation on land and water. Popular activities on land include passive pursuits, such as swimming, sunbathing, shoreline fishing, walking along the beach and boardwalk while enjoying the coastal setting. Other visitors dine at restaurants, shop and enjoy various entertainment activities offered throughout the shore area. Popular activities on water include fishing, paddling, sailing, and power boating. Charter services also provide visitors with opportunities for offshore fishing and sightseeing. Tourists, vacationers and recreational users on coastal or open water locations will be the most sensitive to activity at the proposed Port, since quality views of the ocean are an integral part of their recreational experience.

While ocean views are an important aspect of the recreational experience, shoreline developments and other nearby shoreline activities will command the attention of shoreline visitors. Tourists, vacationers and recreational users currently view a nearly unbroken stretch of waterfront development on Long Beach Island including dense high- and low-rise residential housing, vacation accommodations, commercial establishments and recreational and entertainment facilities often bustling with activity. On Jones Beach Island and Fire Island, large parking fields, bathhouses, boardwalks and other common ocean beach amenities create a developed character to portions of these barrier beaches.

The tourism economy of the coastal area is largely seasonal. Greater numbers of tourists, vacationers and recreational users will be present in the coastal area when the weather is clear and warm as compared to overcast, rainy or cold days. In addition, more recreational users will be present in the coastal area on weekends and holidays than on weekdays.

3.2.2 Local Residents

Local residents are likely to have the best understanding of the aesthetic character and existing conditions of the coastal area. These viewers are likely to be stationary and may have frequent and prolonged views. They know the waterfront and may be sensitive to particular changes to views that are important to them. Due to significant off-shore distance the only residents affected by the project will be those residing in the upper floors of high-rise buildings along the oceanfront in the City of Long Beach. The proposed LNGRV's will not be substantively visible above the horizon from low-rise residential properties anywhere within the 25-mile radius study area.

3.2.3 Travelers

This group includes non-local viewers such as travelers along roads with views of the Atlantic Ocean. Given the importance of seasonal tourism to the coastal area, there is a great deal of traffic on coastal roads. While major thoroughfares tend to be outside or on the periphery of the area of study, leisurely drives on oceanfront boulevards between coastal municipalities are common. However, waterfront development, dunes and coastal vegetation substantially obstruct views of the ocean from roadways. Travelers will not be impacted by the proposed project from their vehicles.

3.2.4 Commercial Mariners

Commercial fisherman and seaman transiting typically have low sensitivity to the presence of LNGRV's. These viewers would be engaged in activities associated with their jobs with minimal focus on the aesthetic character of their surroundings. Moreover, commercial mariners would be more accustomed to the presence of industrial activities and ocean-going vessels within their day-to-day environment than other viewer types.

3.3 Duration/Frequency/Circumstances of View

The analysis of a viewer's experience must include the distinction between stationary and moving observers. The length of time and the circumstances under which a view is encountered is influential in characterizing the importance of a particular view.

3.3.1 Stationary Views

Stationary views are experienced from fixed viewpoints. Characteristically, stationary views offer sufficient time, either from a single observation or repeated exposure, to interpret and understand the physical surroundings. For this reason, stationary viewers have a higher potential for understanding the elements of a view than do moving viewers.

Stationary views can be classified as short-term and long-term exposures. Long-term exposure sites include residences and places of employment where a stationary observer is likely to have regular exposure to the project. Short-term exposure sites include locations where a stationary observer is only visiting, and the exposure is irregular or infrequent. These locations may include beaches or other coastal areas. How long any view is held is at the discretion of the stationary observer.

3.3.2 Moving Views

Moving views are experienced in passing, such as from vehicles and craft, where the time to comprehend a particular view is limited and more attention is given to navigating traffic and following signage. Typically such views apply to drivers and commuters.

Recreational boaters have greater opportunities to comprehend and discern their surroundings. For sailboats and very slow moving seacraft, visual recognition may be similar to that described for stationary viewers. Though for reasons of safety including avoidance of other vessels and flotsam, a boater's attention may nevertheless focus more on the direction of travel than on other directions.

4.0 VISUAL IMPACT ASSESSMENT

4.1 INVENTORY OF VISUALLY SENSITIVE RESOURCES

Visually sensitive resources are places generally considered to be of cultural importance, aesthetic importance, or both. For most land-based projects it is accepted visual assessment practice to inventory and evaluate potential project visibility on specific receptors. These receptors are expressly protected by regulatory authority due to recognized cultural, recreational or scenic importance (resources of statewide significance), and places that hold local sensitivity or otherwise maintain a high intensity of use (resources of local importance).

As a practical reality the entire oceanfront within the area of study is of great aesthetic importance to the social, cultural and economic well being of every municipality in the coastal area. Specific sites are indeed important and listed below. However, for the purpose of this visual resource assessment, all public places with ocean views are considered to be of statewide significance and evaluated accordingly.

4.1.1 Resources of Statewide Significance

Public Beaches – All municipalities within the area of study provide public access to the beach. In addition, Jones Beach and Robert Moses State Parks provide beach access to the general public. Beach access areas range from simple on-street parking and footpaths to dedicated off-street parking facilities, guarded bathing areas, bathhouses, concessions, playgrounds and other amenities. Miles of uninterrupted public beach extends throughout the area of study. These beaches are popular and frequently crowded during the summer months.

Oceanfront Boardwalks – The City of Long Beach has a significant stretch of boardwalk separating the public beach from private beachfront properties and oceanfront boulevards. This boardwalk is highly popular for walking and bicycling and often provides direct access to popular beach related businesses such as concessions, restaurants, shops and entertainment establishments. Boardwalks are heavily traveled during the summer season.

4.1.2 Private Properties

The coastal area includes numerous private residential properties (largely primary homes and high-rise apartments) that are clearly oriented to take advantage of ocean views. Single-family residential structures are commonly two-stories in height. On Long Beach Island, multi-family and condominium type structures are three to four stories. Residential structures in and around Long Beach are five to eight stories high. The tallest oceanfront structure within the area of study is approximately 10 stories in Long Beach. The coastal area is also a popular seasonal tourist destination with many oceanfront and inland homes available for seasonal rental.

4.2 Selection of Key Receptors for Detailed Analysis

Viewpoints selected for more detailed analysis are included in Table 4:

Table 4 – Key Receptors

Simulation (see Appendices A and B)	Location Name	Municipality	State	Distance from LNGRV in miles (km)	Vantage Point Elevation	Distance Zone
Figure A-1A	On-Water View 0.5 Mile From LNGRV	N/A	NA	0.5 (0.8)	20 ft (6.1 m)	Foreground
Figure A-1B	On-Water View 1.0 Mile From LNGRV	N/A	NA	1.0 (1.6)	20 ft (6.1 m)	Mid-ground
Figure A-1C	On-Water View 3.0 Miles From LNGRV	N/A	NA	3.0 (4.8)	20 ft (6.1 m)	Mid-ground
Figure A-1D	On-Water View 5.0 Miles From LNGRV	N/A	NA	5.0 (8.4)	20 ft 6.1 m)	Background
Figure A-1E	On-Water View 10.0 Miles From LNGRV	N/A	NA	10.0 (16.1)	20 ft (6.1 m)	Background
Figure B-1	Robert Moses State Park East Beach	Babylon	NY	22.0 (35.4)	20 ft (6.1 m)	Background
Figure B-2	Robert Moses State Park West Beach	Babylon	NY	20.9 (33.6)	20 ft (6.1 m)	Background
Figure B-3	Gilgo Beach State Park	Hempstead	NY	19.7 (31.7)	20 ft (6.1 m)	Background
Figure B-4	Jones Beach State Park – East Bathhouse	Hempstead	NY	18.8 (30.2)	20 ft (6.1 m)	Background
Figure B-5	Jones Beach State Park – West Bathhouse	Hempstead	NY	18.9 (30.5)	20 ft (6.1 m)	Background
Figure B-6	Point Lookout Town Park	Hempstead	NY	19.7 (31.7)	20 ft (6.1 m)	Background
Figure B-7	Lido Beach West Town Park	Hempstead	NY	20.3 (32.7)	20 ft (6.1 m)	Background
Figure B-8	Long Beach Boardwalk - East End	Long Beach	NY	20.8 (33.5)	26 ft (7.9 m)	Background
Figure B-9	Long Beach High-rise- East End	Long Beach	NY	20.8 (33.5)	102 ft (31.1 m)	Background
Figure B-10	Long Beach Boardwalk - West End	Long Beach	NY	21.9 (35.3)	26 ft (7.9 m)	Background
Figure B-11	Long Beach High-rise- West End	Long Beach	NY	21.9 (35.3)	102 ft (31.1 m)	Background
Figure B-12	Atlantic Beach Town Park	Atlantic Beach	NY	23.8 (38.4)	20 ft (6.1 m)	Background

4.3 Simulation of Project Appearance

Photo realistic simulations of the proposed Port were prepared for each of the 17 key receptors listed above.

4.3.1 Existing Condition Photographs

Photographs were taken from each key receptor on April 13, 2012. To determine the direction of the proposed Port from each receptor the approximate midpoint between the two (2) proposed mooring buoys was pre-programmed as a "waypoint" into a handheld Global Positioning System (GPS). The GPS waypoint direction indicator (arrow pointing along calculated bearing) was used to determine the appropriate bearing for the camera, so that the proposed Port would be generally centered in the field of view of each photograph.

Photographs were taken with a digital camera using a lens focal length setting (50mm) to approximate normal human eyesight relative to scale. The location selected for each photograph was judged by the field observer to be the most unobstructed vantage point of highest elevation within the subject visual resource. The precise location of each photograph was recorded using the handheld GPS unit.

The field visit was conducted under clear weather conditions with unlimited offshore visibility. To the degree possible, photographs were taken at a time of day when the sun was to the back of the photographer to minimize the effect of glare within the camera's field of view and to maximize visible contrast of the landscape being photographed. Photographs were taken using a polarizing filter to minimize glare.

4.3.2 Photographic Simulations

To illustrate anticipated visual changes resulting from the proposed project, photographic simulations were prepared for each of the 18 key receptors. Project visualizations were developed by superimposing a rendering of a three-dimensional computer model of the proposed Project into the base photograph taken from each corresponding visual resource. The three-dimensional computer model was developed in Autodesk Architectural Desktop, AutoDesk Land Development Desktop software and Autodesk Max (Max) software.

<u>3D Model</u> – Photo simulations were developed by first constructing a three-dimensional computer model of two (2) typical LNGRV's geo-referenced to the proposed mooring buoy coordinates. The three-dimensional model was constructed using design dimensions and specifications in sufficient detail to be visually representative of the proposed project.

The proposed Port and GPS recorded camera coordinates were then imported into a single 3D model file in Autodesk Max software. All model components were constructed using a common coordinate system, UTM NAD 1983, to assure accurate alignment.

<u>Photo Alignment</u> – Simulated perspectives (camera views) were then matched to the corresponding base photograph for each simulated view by replicating the precise UTM coordinates of the field camera position (as recorded by GPS) and the focal length of the camera lens used (50mm). Precisely matching these parameters assures scale accuracy between the base photograph and the subsequent simulated view. The center of the proposed Port was set as the camera's target position. With the existing conditions photograph displayed as a "viewport background," minor camera adjustments were made (horizontal and vertical positioning, and camera roll) to align the horizon in the background photograph with the corresponding features of the 3D model.

<u>Earth Curvature</u> –The baseline vertical elevation (Z coordinate) of each LNGRV model was established at 0 ft representing sea level. In order to account for the affect of earth curvature, the Z coordinate each LNGRV model was manually decreased equal to the distance (height) of the portion of the proposed Port falling below the optical horizon given the horizontal distance and viewer elevation of each simulated viewpoint (refer to Table 2 on page 19).

For example, based on Table 2, at a distance of 19 mi (30 km) and a viewer elevation of 20 ft (6.0 m) above water level, the lower 95 ft (29.0 m) of the LNGRV would fall below the optical horizon. In this case, to account for 95 ft of the vessel hidden by the horizon in the subsequent photographic simulation, the waterline elevation of the 3D model (Z coordinate) of the LNGRV was adjusted from 0 to minus (–) 95 ft. When rendered, the portion of the simulated LNGRV lying below the actual optical horizon line visible in the base photograph was airbrushed out during postproduction editing, thus leaving only the portion of the LNGRV's sitting above the optical horizon visible in the final photographic simulation.

<u>LNGRV Orientation</u> – Consistent with the objective of illustrating worst-case visual conditions, the attendant LNGRV's are oriented to present a near broadside view from each simulated vantage point.

Rendering – The proposed condition model was rendered at the same image aspect ratio (1.5), and using the base photograph as a background environment map. The 3D model was rendered using sunlight settings approximating the date and time of day the base photograph was taken. To the extent practicable and to the degree necessary to reveal impacts, conceptual design details of the proposed facilities were built into the 3D model and incorporated into the photo simulation. Consequently, the scale, alignment, elevations and location of the visible elements of the proposed facilities are true to the conceptual design. The rendered view was opened using Adobe Photoshop software for post-production editing (i.e., airbrush from visibility the portion of Proposed Port that falls below optical horizon).

4.3.3 Viewing the Photo Simulations

Arm's Length Rule – The Project visualizations contained in Appendices A and B have been printed using an 11"x17" page format. At this image size, the page should be held at approximately 'arms length'9 so that the scene will appear at the correct scale. A closer viewing distance would make the scene appear too large, and a farther viewing distance would make the scene appear too small when compared to what an observer would actually see in the field.

For viewing photo simulations at other page sizes (i.e., computer monitor, projected image or other hard copy output) the ratio of viewing distance to page width ratio is approximately 1.5 to 1. For example, if the simulation were viewed on a 42-inch wide poster size enlargement, the correct viewing distance would be approximately 63 inches, or 5 ¼ ft.

Field Viewing – The photo simulations are suitable for a general understanding of the degree and character of Project appearances. However, these images are a two-dimensional representation of a three-dimensional landscape. The human eye is capable of recognizing a greater level of detail than can be illustrated in a two-dimensional image. Agency decision-makers and interested parties may benefit from viewing the photo simulations in the field from any or all of the simulated vantage points. In this manner, observers are able to directly compare the level of detail visible in the base photograph with actual field observed conditions.

4.4 Degree and Character of Project Visibility

Figure A-1 and Figure B-1 through Figure B-12 provide a photographic representation of project visibility from key receptor locations. A summary diagram is also provided within these figures identifying visible Project components and degree of visibility above the optical horizon.

4.4.1 Compatibility with Regional Landscape Patterns

The visual character of a landscape is defined by the patterns, forms and scale relationships created by lines, colors, and textures. Some patterns dominate while others are subordinate. The qualitative impact of a project is the effect it has on these patterns, and ultimately on the visual character of the regional landscape.

The following describes the compatibility of the proposed project with regional landscape patterns within which it is contained and viewed. This evaluation is graphically depicted in the photographic simulations noted in Section 4.3.

Form – The regional landscape within the Project viewshed is comprised entirely of the Atlantic Ocean and its immediate shoreline. The patterns of this open water are temporal, changing with wind, sun angle, cloud cover, and other factors that affect the texture and colors of the surface.

The proposed Port will appear during daylight conditions as a series of small, flattened rectangular figures of gray complexion and almost flush with the distant horizon. Although relatively small within the context of the ocean, the geometric form of the attendant vessels are visible slightly above the horizon and contrasts with the expansive planar form of the ocean and sky.

Line – Both the shoreline and the horizon are defining linear elements. Quite often however, due to atmospheric perspective (hazing) there is little discernible distinction between land, water and sky at the distant horizon. During ideal clear weather conditions, the horizon line will be the dominant linear element of the landscape. At foreground distances, the visual composition of the visible LNGRV's is a complex of horizontal, vertical and diagonal lines that contrast with the surrounding landscape. From distant coastal vantage points, these disparate lines tend to appear simplified as a two-dimensional outline of the overall form. While the outline of the Project will break the visible horizon, the Project will from most ground level vantage points appear to be quite low and difficult to distinguish from the horizon, if visible at all.

Color – Due to the effect of atmospheric perspective (hazing) at distances greater than 19 mi, the LNGRV's will be relatively uniform in color and appear a muted blue-gray from coastal vantage points. During periods of haze, fog or precipitation, color contrast from on-water or the nearest shoreline receptors will diminish or disappear completely. The color of visiting LNGRV's is specific to individual vessels and may vary from muted hues consistent with the ocean seascape, to bright contrasting colors.

Texture – The texture of the open water viewed out to the horizon is smooth during calm weather conditions. The texture will appear more choppy and misty during inclement weather. Views of LNGRV's from foreground distances reveal complex structural components creating a notable contrast in texture. Such textural contrast is diminished substantially with distance, as structural complexity appears to simplify due to distance and atmospheric perspective (hazing).

Scale – LNGRV's will appear smaller than the ocean-going vessels within the Ambrose/Nantucket shipping lane. The shipping lane, 8-14 mi (14-22 km) offshore at Jones Beach Park, is slightly roughly half the distance between the shore and the proposed Port. Vessels transiting the shipping lane will appear larger and more visually prominent than LNGRV's at the proposed Port behind them. However because the vessels in the channel are transient, views of them are temporal.

Spatial Dominance – The Atlantic Ocean is visually dominant by virtue of its spatial expanse. When discernible under clear atmospheric conditions, the LNGRV's will be visually subordinate to the expansive seascape and existing oceangoing vessels as they transit the area.

4.4.2 Visual Character during the Construction Period

The LNGRV's will not be present in the project region during the construction period. The mooring buoys and sub-sea connections will be constructed in place and will require temporary mooring of several barges and other work vessels. Therefore visual impact during the construction period is expected to be consistent with the minimal impacts described for the Project.

Construction of the sub-sea 26" mainline will require use of temporarily moored barges and cranes lowering pipeline segments to the sea floor. These vessels will be moved along the route of the pipeline as construction progresses and are not expected to result in prolonged adverse visual impact to distant coastal vantage points.

For both mooring base installation and sub-sea pipeline construction, supply barges and other construction vessels are expected to transit the ocean from staging ports outside of the area of study. These vessels will be relatively infrequent and will be indistinguishable from other commercial barges that commonly ply local waters.

4.4.3 Lighting Impacts

The Long Island shore is a densely developed and highly illuminated coastline. Outdoor commercial, residential and public street lighting contribute to bright urban lighting conditions throughout most of the area of study. Moreover, the upward dispersion of light emanating from densely developed communities commonly reflects off atmospheric particulate matter and low cloud cover, limiting views of the stars and resulting subtle atmospheric illumination. This effect is known as sky glow. Views from the beachfront over the open water commonly include occasional dim flashes of navigational aids as well as navigational and deck lights of passing commercial and recreational vessels.

Operational Lighting – LNGRV's arriving at the proposed Port will be well illuminated for operational and safety purposes. Actual lighting systems will be specific to the individual vessel, but will likely include high intensity floodlighting of deck and equipment handling areas during regasification operations. The Project will likely include maritime navigation aids system. These are federally mandated safety features and cannot be omitted or reduced.

On clear nights, at distances of approximately 19 mi (30 km) and greater from the nearest coastal vantage point, LNGRV operational lighting will appear as a dim cluster of white or yellow/orange clusters on the horizon. Actual points of light will tend to have a shimmering effect due to optical refraction at such extended distances. From many beachfront locations the vessel lights of the proposed Port will be a point of visual interest when viewed within a nighttime setting. While these lights may be similar in appearance to a passing ship, the lights within the proposed Port will appear fixed and remain throughout nighttime hours. Based on meteorological history, nighttime visibility will be obscured by weather conditions approximately one-half of the time (refer to Section 3.1.3 on page 21).

Lighting impacts will occur only when one or both LNGRV's are moored at the proposed Port. Lighting impacts will be greatest when both STL Buoys are in use.

Navigational Aid Lighting – Typical offshore projects have a Maritime Navigation Aids System that includes deck lighting and a slow flashing system visible for 10 nm (11.5 mi [18.5 km]). Subsidiary warning lights are generally located on port and starboard sides of the structure, and are visible for 2 nm (2.3 mi [3.7 km]). These maritime obstruction lights are consistent with navigation aid systems commonly found throughout the near shore area.

Considering that the proposed Port will be approximately 19 mi (16.5 nm [30 km]) from the nearest coastal vantage point, it is unlikely that maritime navigation obstruction lighting will be discernible to the naked eye from shore.

5.0 CONCLUSION

The Project will have no land based port structures or storage facilities since the gas is converted onboard the transient LNGRV in a closed-loop system and delivered onshore to existing storage and energy production facilities. No visual impacts will be associated with the STL Buoy mooring system or sub-sea pipeline. The only visible Project component will be up to two transient LNGRV's moored a minimum of approximately 19 mi (30 km) offshore.

From ground level vantage points along the Long Island beaches, moored LNGRV's will appear to be quite low on the horizon and as distance increases, increasingly difficult to distinguish; if visible at all. When visible, LNGRVs will generally appear as small two-dimensional rectilinear form on the distant horizon.

From beach, boardwalk and dune elevations, the hull of the LNGRV (trunk deck and below [78 ft or 23.7 meters above water line]) will fall below the visible horizon as viewed from all costal vantage points. Only relatively minor structures, such as masts, cranes, navigation bridge, crew quarters and stack, could potentially be visible above the horizon. Combined with atmospheric haze, even on a relatively clear day, these taller vessel structures would be difficult to discern with the naked eye. Due to the project's extended off-shore distance, visibility of the LNGRV hull is possible only from the upper floors of oceanfront high-rise buildings in the City of Long Beach.

Meteorological conditions (e.g., haze, fog, precipitation, etc.) limit visibility to less than 10 nm (11.5 mi [18.5 km]) approximately 48 percent of the time on an annual basis. In general, views greater than 10 nm are obscured more frequently during the summer months (approximately 60 percent of the time), when oceanfront destinations are more frequently visited. Since meteorological visibility is recorded in increments only up to 10 nm, coastal vantage points 16.5 nm (19 mi [24.1 km]) and beyond would be obscured more frequently.

The Project area includes several major shipping lanes that are the principal transit routes for large oceangoing vessels. Ocean-going vessels similar in size and appearance to LNGRVs are commonly, and often clearly, visible within these heavily used shipping lanes at distances substantially closer to shore than the proposed Port Ambrose Project.

Based on these findings, it is clear that the proposed Project will be minimally visible from the Long Island shore. The project will not diminish public enjoyment or appreciation of the beaches or result in a detrimental effect on aesthetic resources of the region.

Appendix A

Project Visualizations – On-Water Views

Proposed Project View

FIGURE A-1A

Project Visualization
On-Water View
0.5 miles from LNGRV

Proposed Project View

FIGURE A-1B

Project Visualization

On-Water View

1.0 miles from LNGRV

Proposed Project View

FIGURE A-1C

Project Visualization

On-Water View

3.0 miles from LNGRV

Proposed Project View

FIGURE A-1D

Project Visualization
On-Water View
5.0 miles from LNGRV

Proposed Project View

FIGURE A-1E

Project Visualization

On-Water View

10.0 miles from LNGRV

Appendix B

Project Visualizations

Photo Location

Existing View

Figure B-1A

Project Visualization

Robert Moses State Park—East Beach

Town of Babylon, NY

22.0 mi. from nearest LNGRV

Proposed Project View

FIGURE B-1B

Project Visualization

Robert Moses State Park—East Beach

Town of Babylon, NY

22.0 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View—with simulated vessels in Nantucket/Ambrose shipping lane

FIGURE B-1C

Project Visualization

Robert Moses State Park—East Beach

Town of Babylon, NY

22.0 mi. from nearest LNGRV

Proposed Project View (Annotated)—with simulated vessels in Nantucket/Ambrose shipping lane

FIGURE B-1D

Project Visualization

Robert Moses State Park—East Beach

Town of Babylon, NY

22.0 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

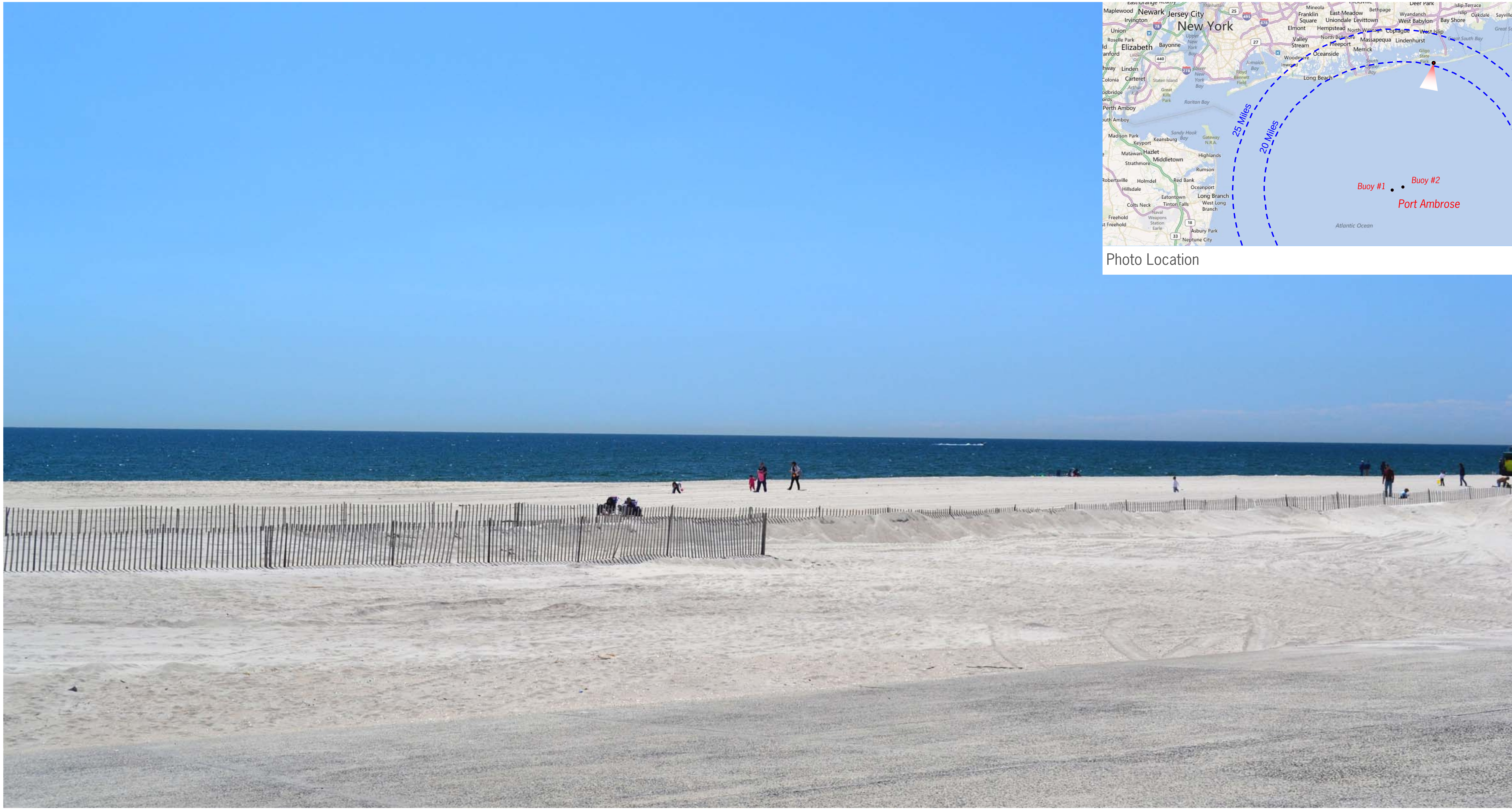


Photo Location

Existing View

FIGURE B-2A

Project Visualization

Robert Moses State Park—West Beach

Town of Babylon, NY

20.9 mi. from nearest LNGRV

Proposed Project View

FIGURE B-2B

Project Visualization

Robert Moses State Park—West Beach

Town of Babylon, NY

20.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View—with simulated vessel in Nantucket/Ambrose shipping lane

FIGURE B-2C

Project Visualization

Robert Moses State Park—West Beach

Town of Babylon, NY

20.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View (Annotated)—with simulated vessel in Nantucket/Ambrose shipping lane

FIGURE B-2D

Project Visualization

Robert Moses State Park—West Beach

Town of Babylon, NY

20.9 mi. from nearest LNGRV

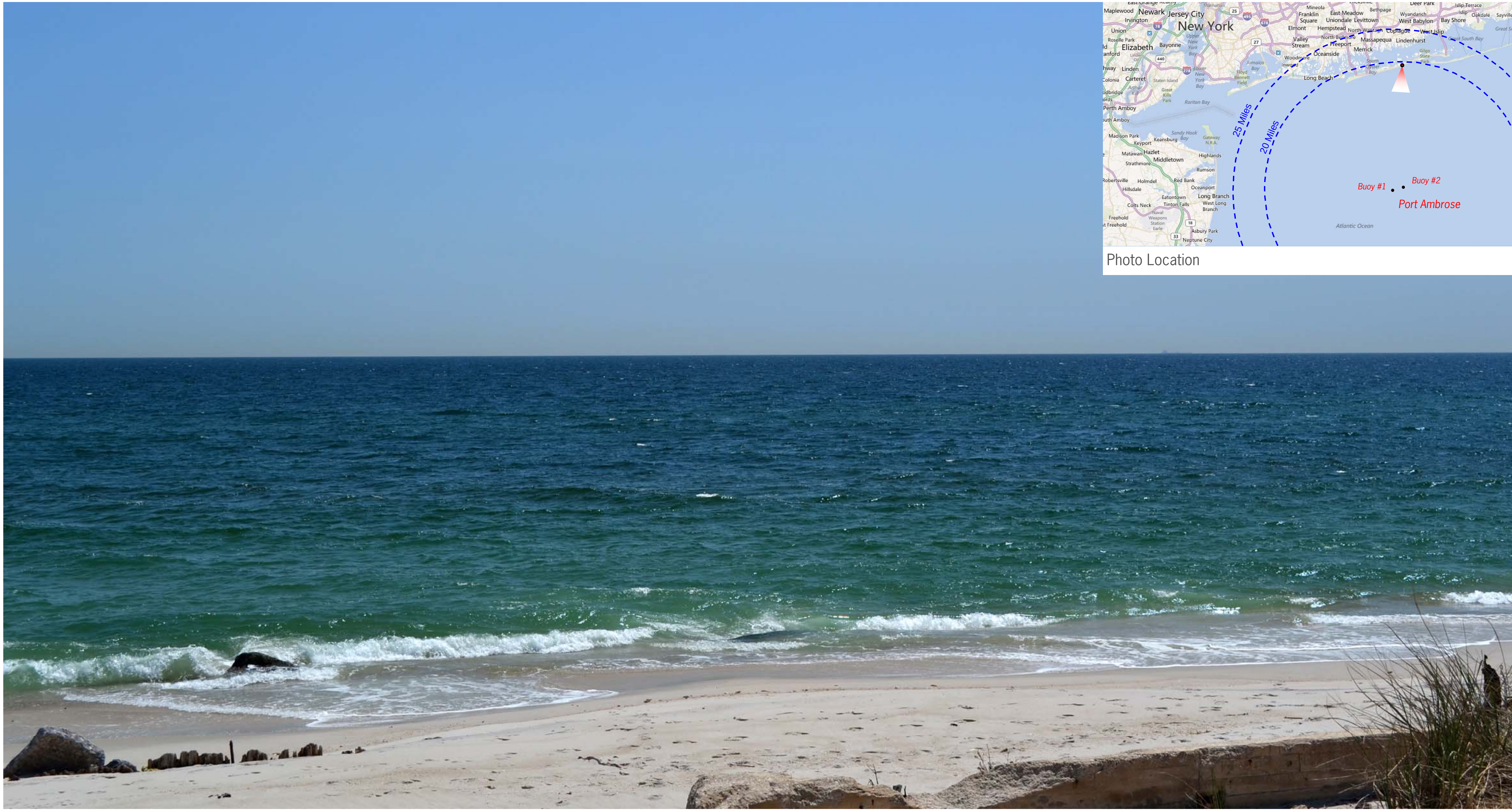


Photo Location

Existing Proposed View—with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-3A

Project Visualization

Gilgo Beach State Park

Town of Babylon, NY

19.7 mi. from nearest LNGRV

Proposed Project View—with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-3B

Project Visualization

Gilgo Beach State Park

Town of Babylon, NY

19.7 mi. from nearest LNGRV

Proposed Project View (Annotated) —with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-3C

Project Visualization
Gilgo Beach State Park
Town of Babylon, NY
19.7 mi. from nearest LNGRV

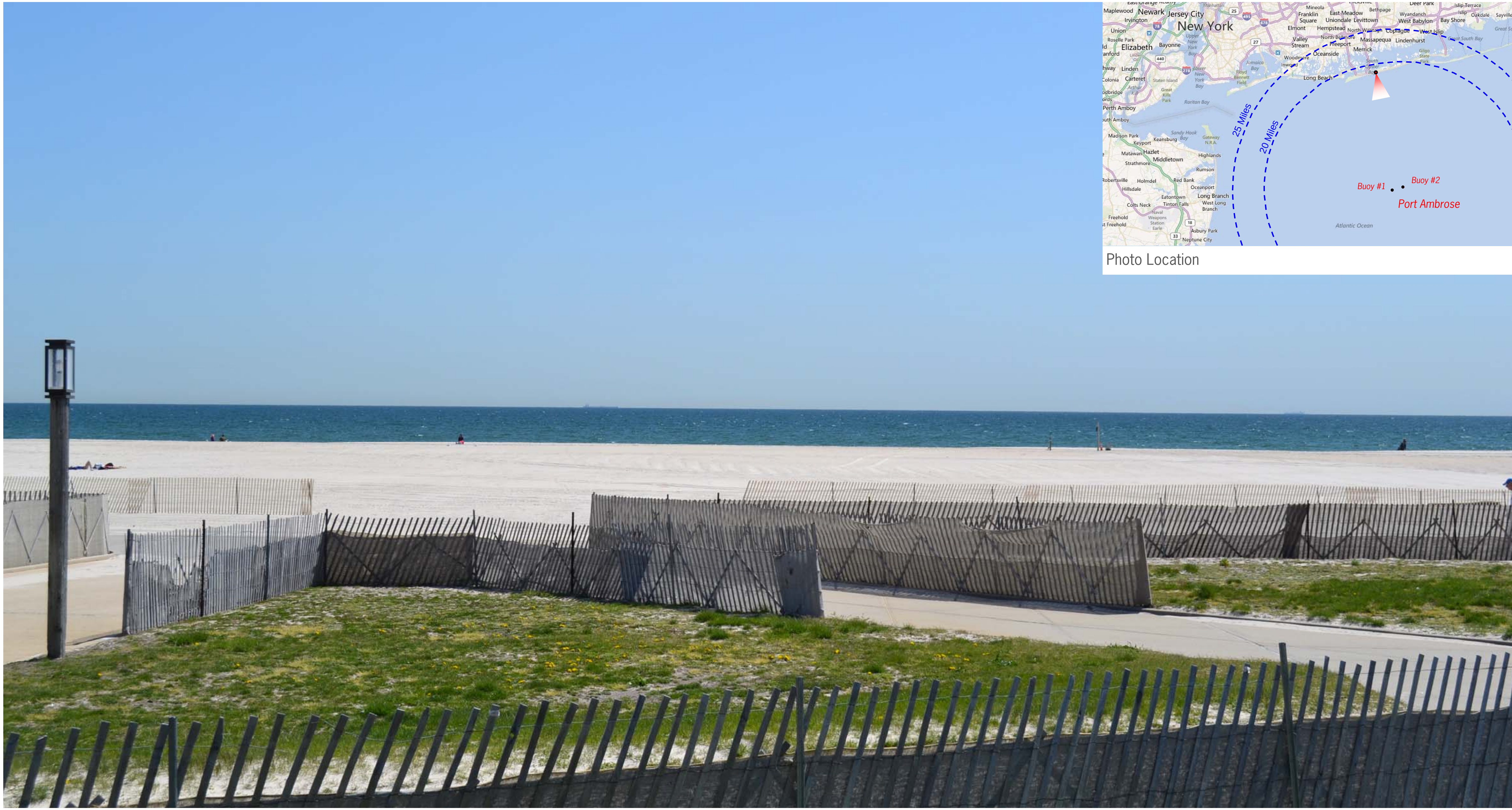


Photo Location

Existing View—with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-4A

Project Visualization

Jones Beach State Park East Bathhouse

Town of Hempstead, NY

18.8 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View—with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-4B

Project Visualization

Jones Beach State Park East Bathhouse

Town of Hempstead, NY

18.8 mi. from nearest LNGRV

Proposed Project View (Annotated)—with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-4C

Project Visualization

Jones Beach State Park East Bathhouse

Town of Hempstead, NY

18.8 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Photo Location

Existing View—with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-5A

Project Visualization

Jones Beach State Park West Bathhouse

Town of Hempstead, NY

18.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View—with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-5B

Project Visualization

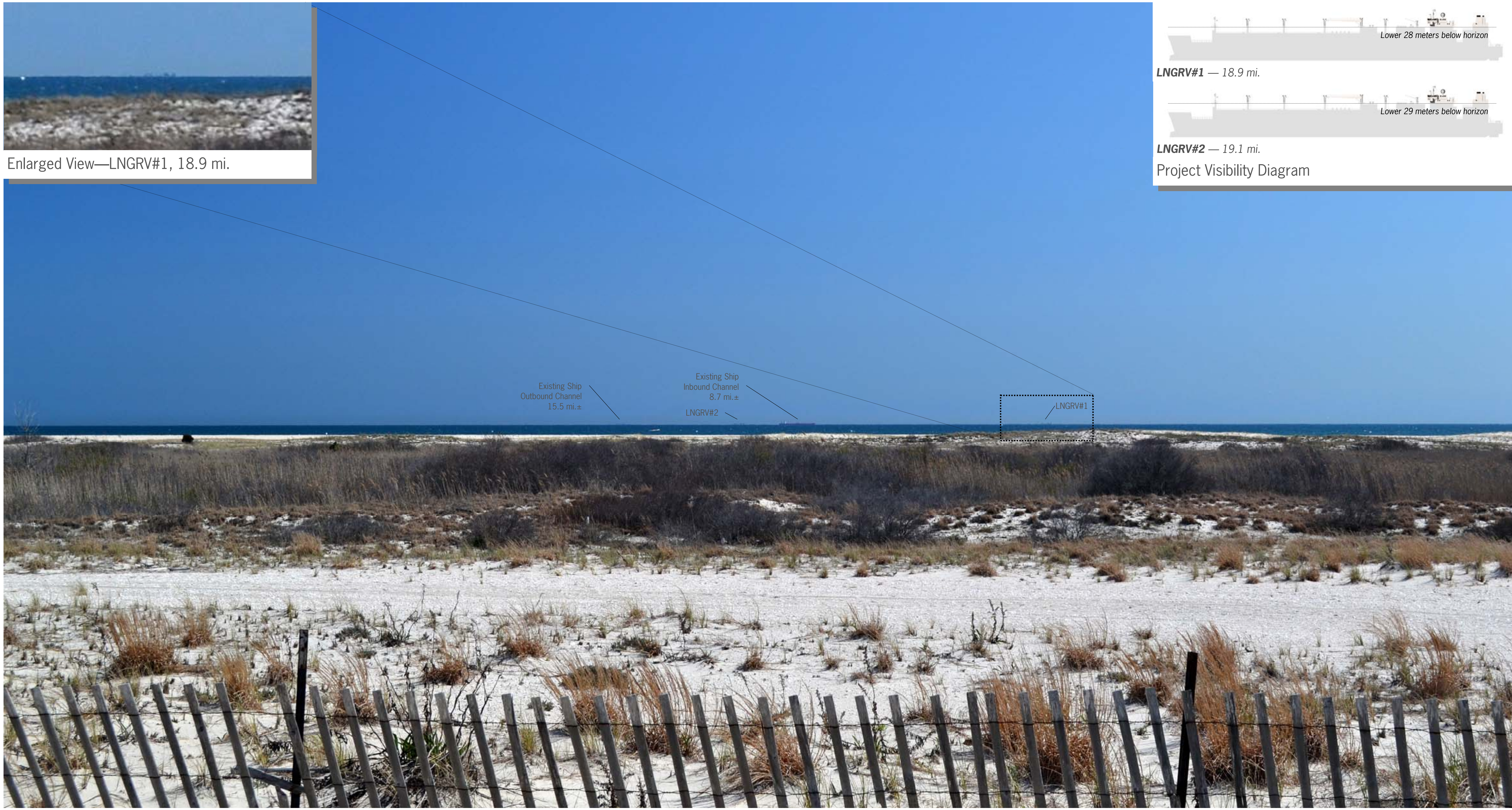
Jones Beach State Park West Bathhouse

Town of Hempstead, NY

18.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE



Enlarged View—LNGRV#1, 18.9 mi.

Project Visibility Diagram

Proposed Project View (Annotated) —with existing vessels in Nantucket/Ambrose shipping lanes

FIGURE B-5C

Project Visualization

Jones Beach State Park West Bathhouse

Town of Hempstead, NY

18.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Photo Location

Existing View—with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-6A

Project Visualization

Point Lookout Town Park

Town of Hempstead, NY

19.7 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View—with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-6B

Project Visualization

Point Lookout Town Park

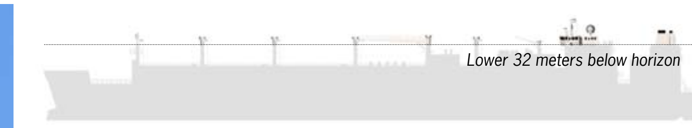
Town of Hempstead, NY

19.7 mi. from nearest LNGRV

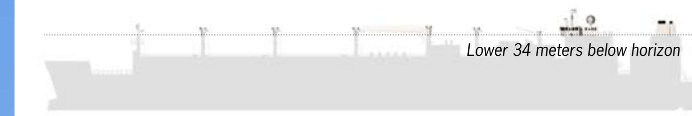
SARATOGA ASSOCIATES

PORTAMBROSE

Enlarged View—LNGRV#1, 19.7 mi.



LNGRV#1 — *19.7 mi.*



LNGRV#2 — *20.1 mi.*

Project Visibility Diagram

Proposed Project View (Annotated) —with existing vessel in Nantucket/Ambrose shipping lane

FIGURE B-6C

Project Visualization

Point Lookout Town Park

Town of Hempstead, NY

19.7 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Photo Location

Existing View

FIGURE B-7A

Project Visualization

Lido Beach West Town Park

Town of Hempstead, NY

20.3 mi. from nearest LNGRV

Proposed Project View

FIGURE B-7B

Project Visualization

Lido Beach West Town Park

Town of Hempstead, NY

20.3 mi. from nearest LNGRV

Proposed Project View—with simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-7C

Project Visualization

Lido Beach West Town Park

Town of Hempstead, NY

20.3 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View (Annotated)—with simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-7D

Project Visualization

Lido Beach West Town Park

Town of Hempstead, NY

20.3 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

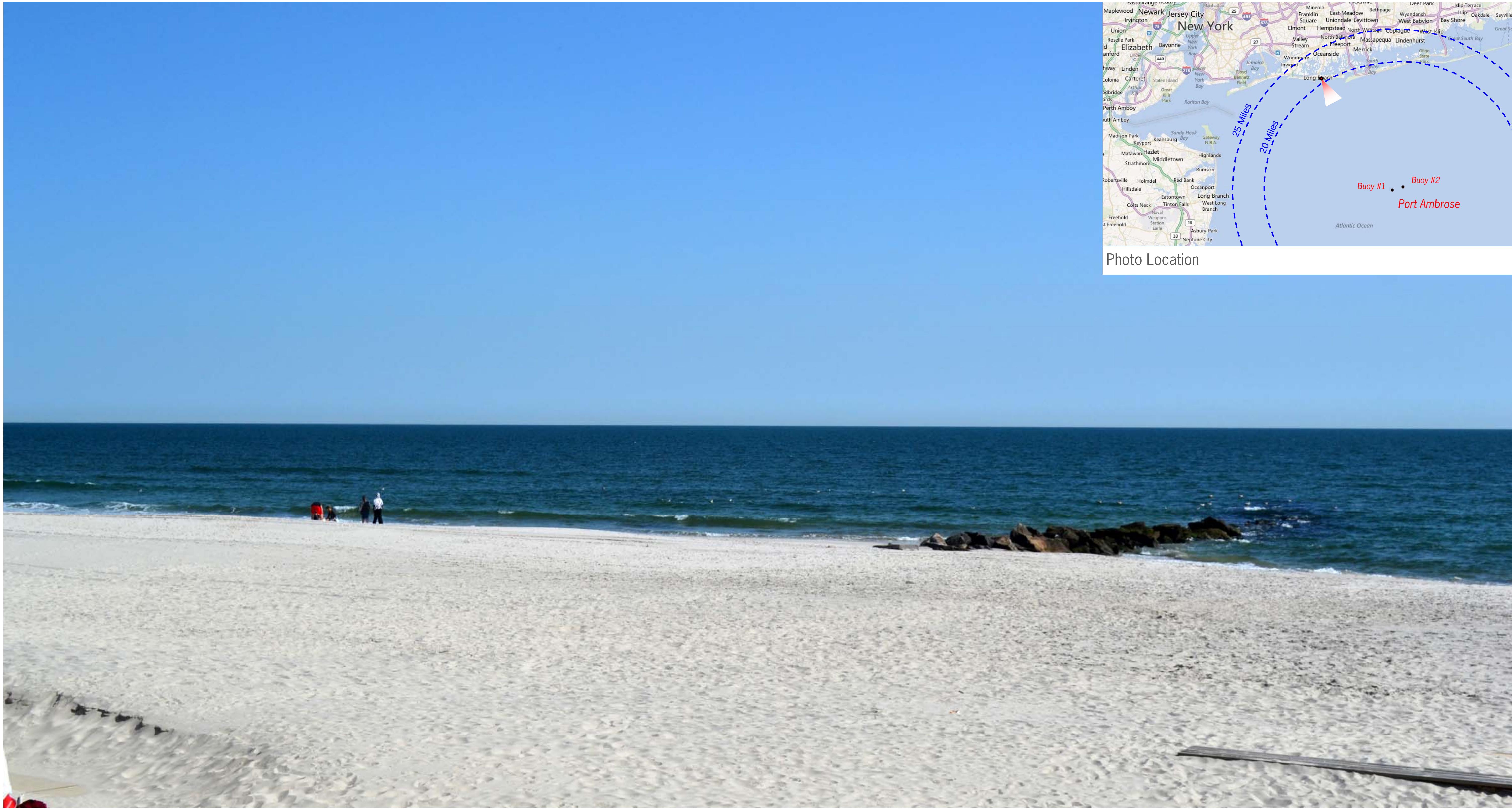


Photo Location

Existing View

FIGURE B-8A

Project Visualization

Long Beach Boardwalk—East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View

FIGURE B-8B

Project Visualization

Long Beach Boardwalk—East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

Proposed Project View —with simulated vessels in Ambrose/Nantucket shipping lanes

FIGURE B-8C

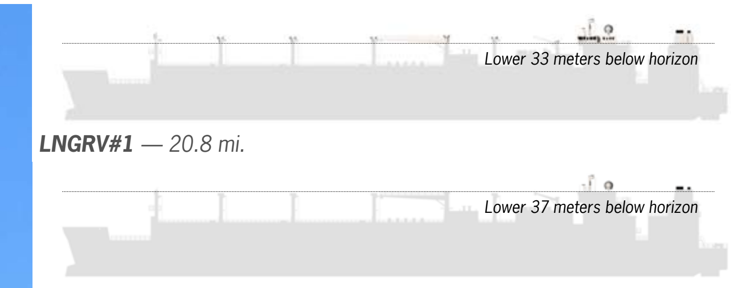
Project Visualization

Long Beach Boardwalk—East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

Enlarged View—LNGRV#1, 20.8 mi.



Project Visibility Diagram

Proposed Project View (Annotated)—with simulated vessels in Ambrose/Nantucket shipping lanes

FIGURE B-8D

Project Visualization

Long Beach Boardwalk—East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

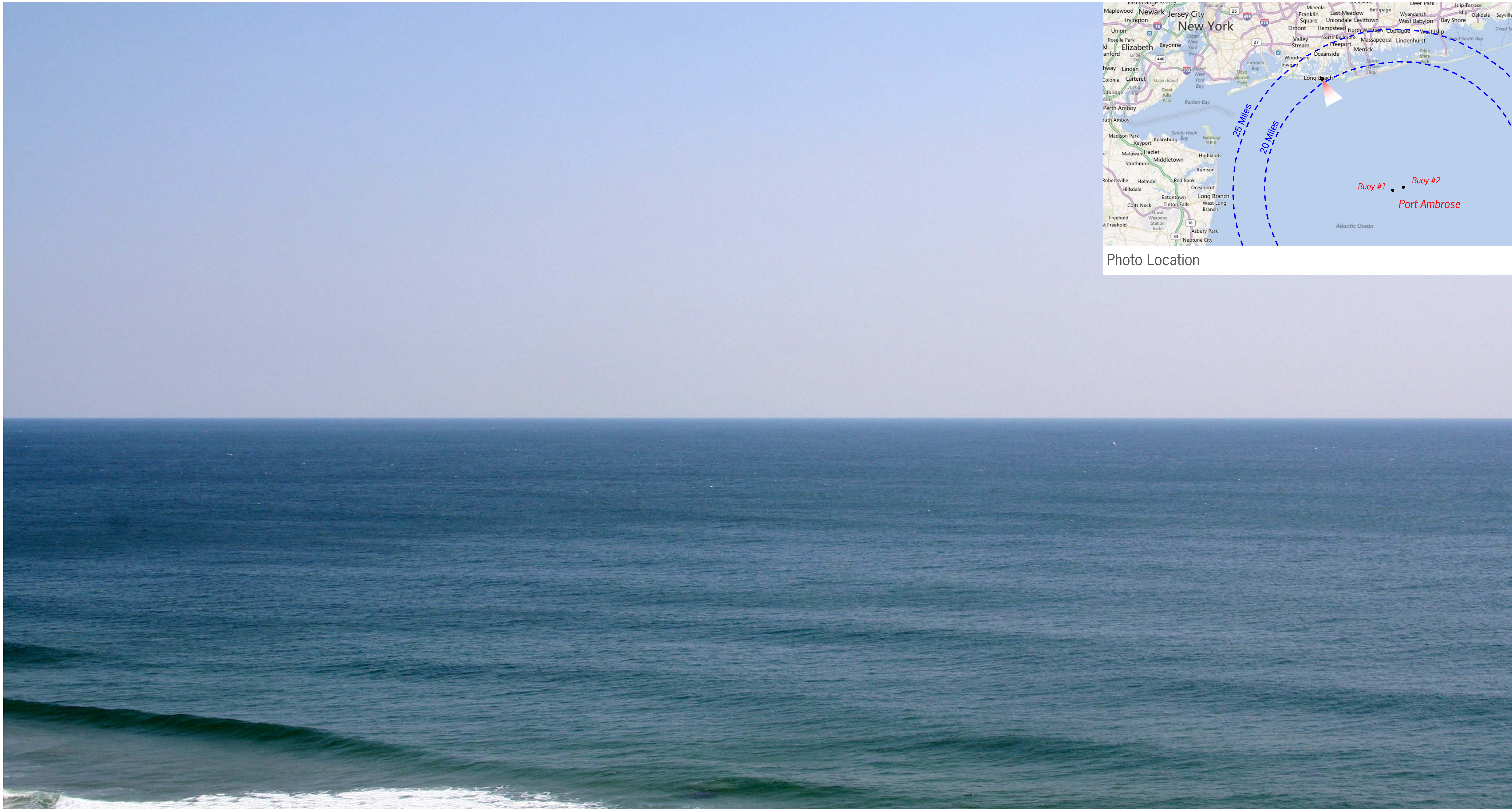


Photo Location

Existing View

FIGURE B-9A

Project Visualization

Long Beach High-rise East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View

FIGURE B-9B

Project Visualization

Long Beach High-rise East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

Proposed Project View —with simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-9C

Project Visualization

Long Beach High-rise East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

FIGURE B-9D

Project Visualization

Long Beach High-rise East End

City of Long Beach, NY

20.8 mi. from nearest LNGRV

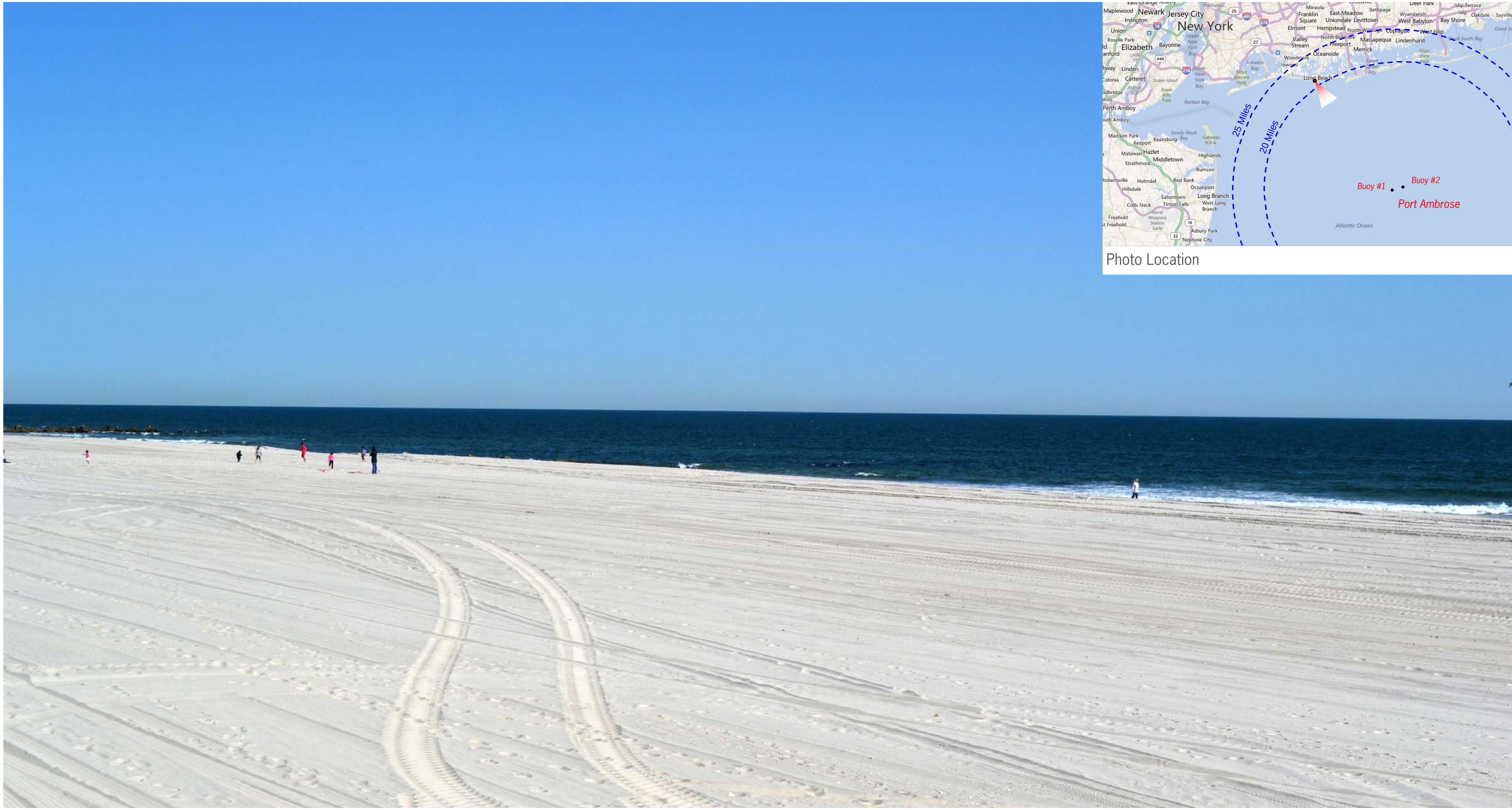


Photo Location

Existing View

FIGURE B-10A

Project Visualization

Long Beach Boardwalk—West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View

FIGURE B-10B

Project Visualization

Long Beach Boardwalk—West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View —with simulated vessels in Nantucket/Ambrose shipping lanes

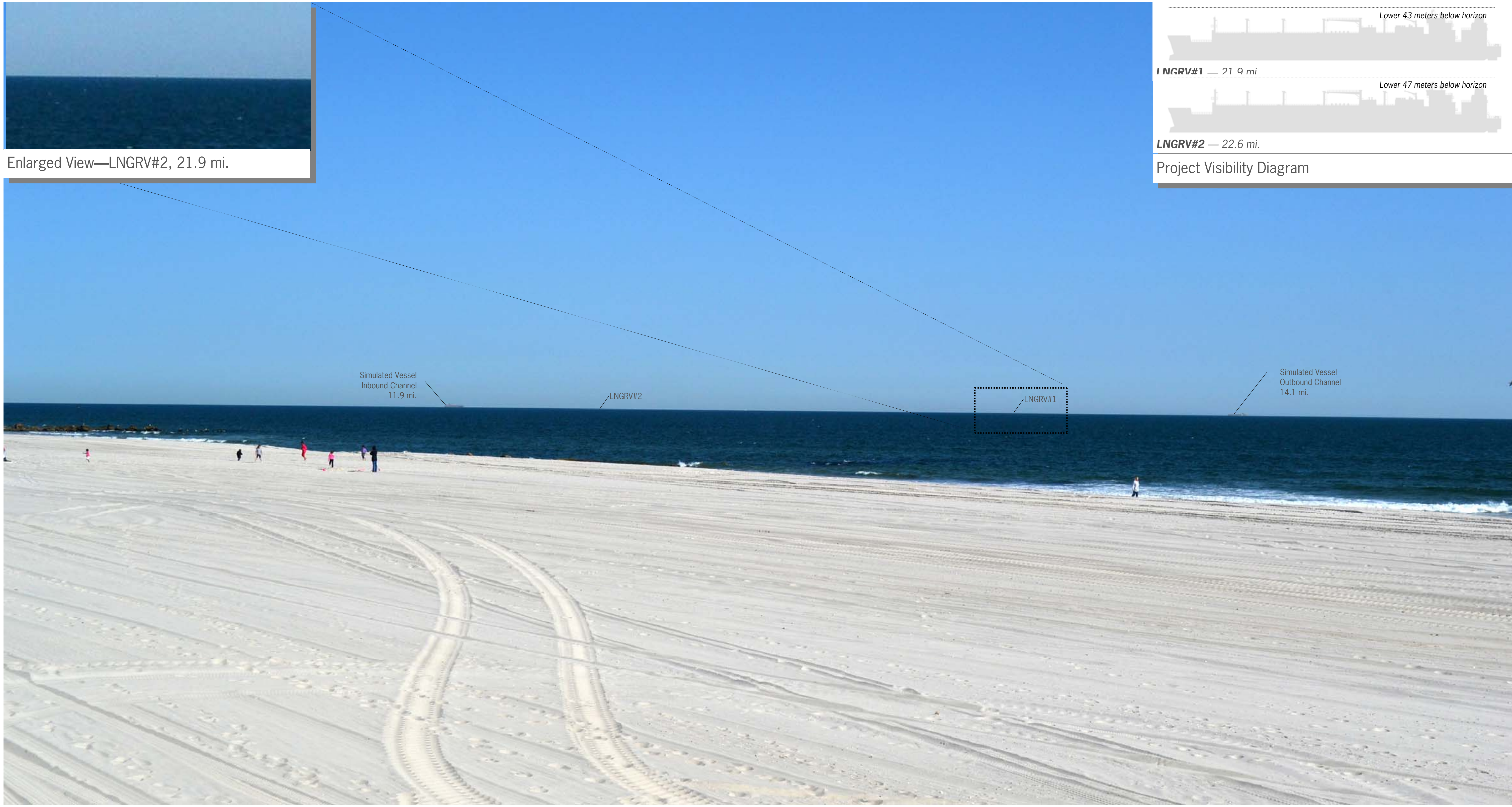
FIGURE B-10C

Project Visualization

Long Beach Boardwalk—West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV



Enlarged View—LNGRV#2, 21.9 mi.

Project Visibility Diagram

Proposed Project View (Annotated) —with simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-10D

Photo Simulation

Long Beach Boardwalk—West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

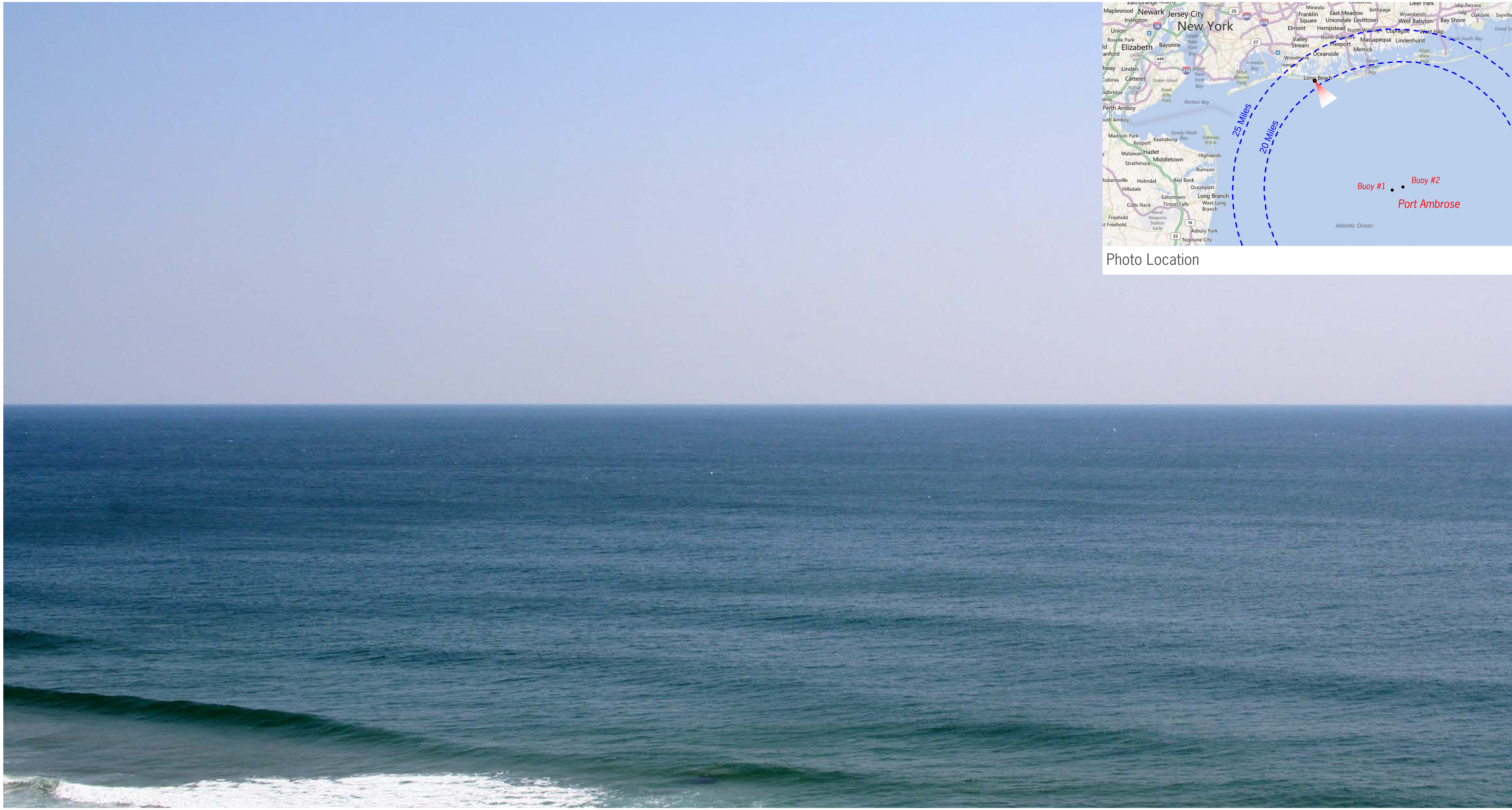


Photo Location

Existing View

FIGURE B-11A

Project Visualization

Long Beach High-rise West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

Proposed Project View

FIGURE B-11B

Project Visualization

Long Beach High-rise West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View —simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-11C

Project Visualization

Long Beach High-rise West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE

Proposed Project View —simulated vessels in Nantucket/Ambrose shipping lanes

FIGURE B-11D

Project Visualization

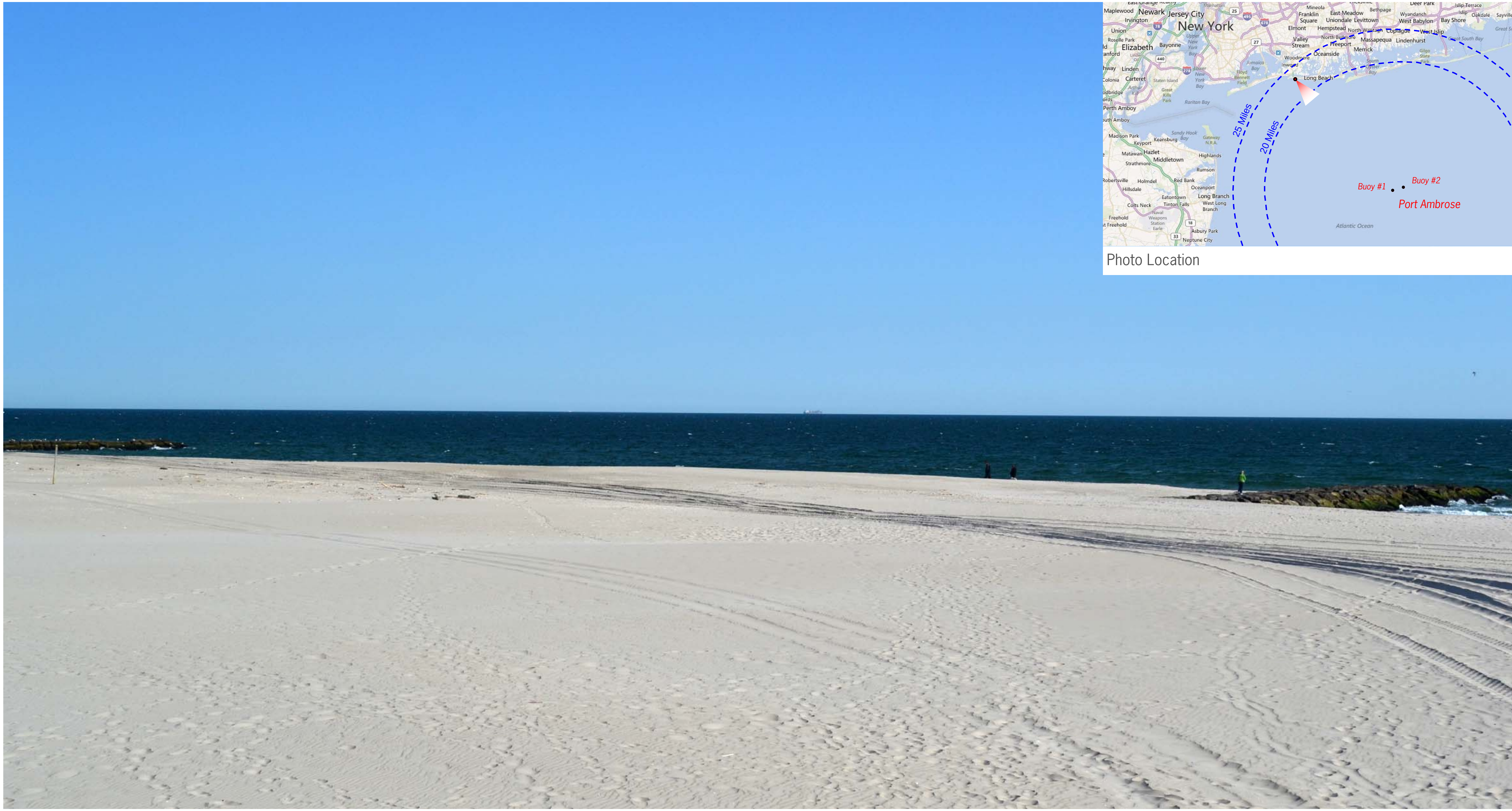
Long Beach High-rise West End

City of Long Beach, NY

21.9 mi. from nearest LNGRV

SARATOGA ASSOCIATES

PORTAMBROSE



Existing View —with existing vessel at anchor near Nantucket/Ambrose shipping lane

FIGURE B-12A

Project Visualization

Atlantic Beach Town Beach

City of Long Beach, NY

23.8 mi. from nearest LNGRV

Proposed Project View —with existing vessel at anchor near Nantucket/Ambrose shipping lane

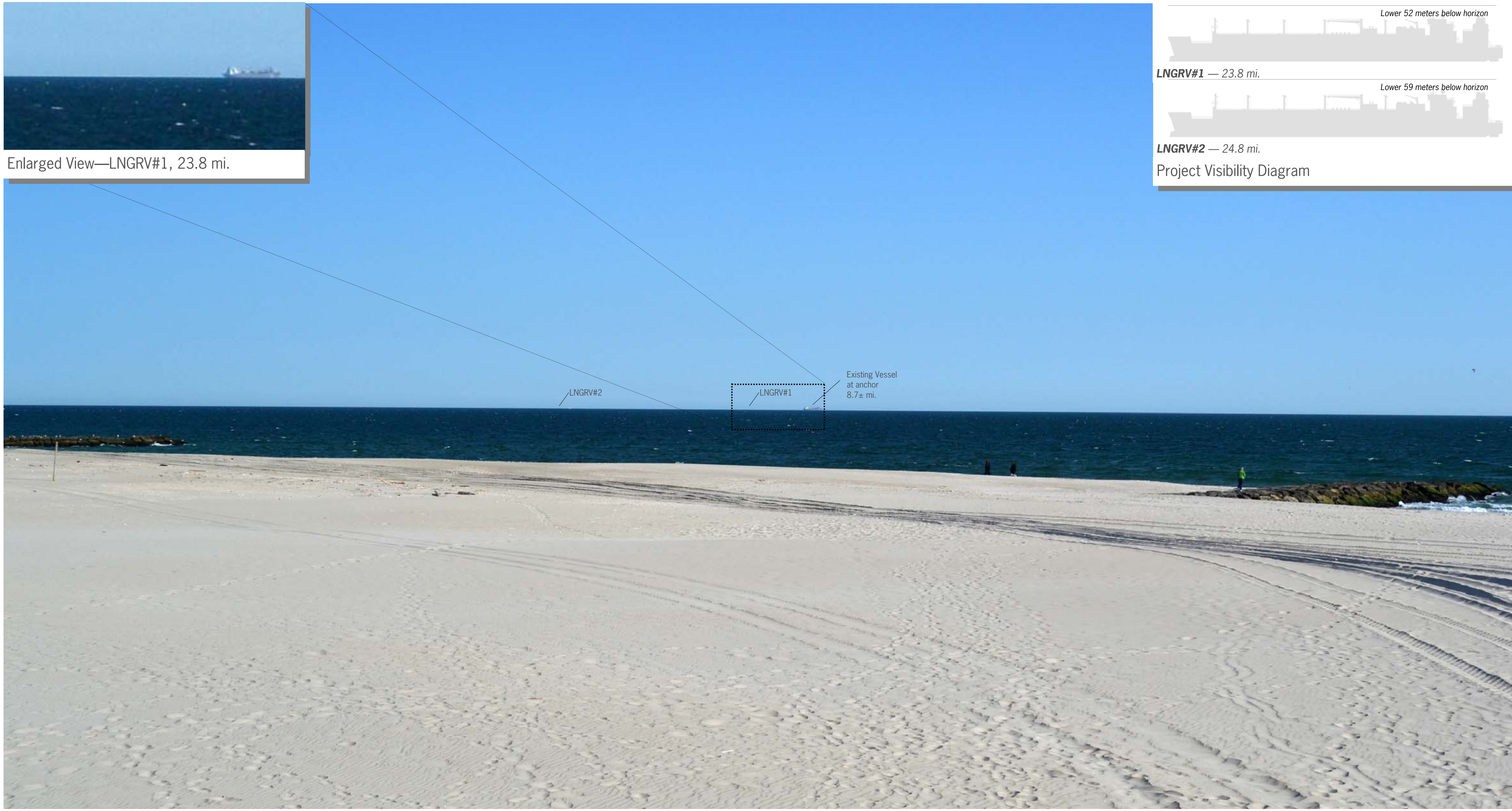
FIGURE B-12B

Project Visualization

Atlantic Beach Town Beach

City of Long Beach, NY

23.8 mi. from nearest LNGRV



Proposed Project View (Annotated)—with existing vessel at anchor near Nantucket/Ambrose shipping lane

FIGURE B-12C

Project Visualization

Atlantic Beach Town Beach

City of Long Beach, NY

23.8 mi. from nearest LNGRV